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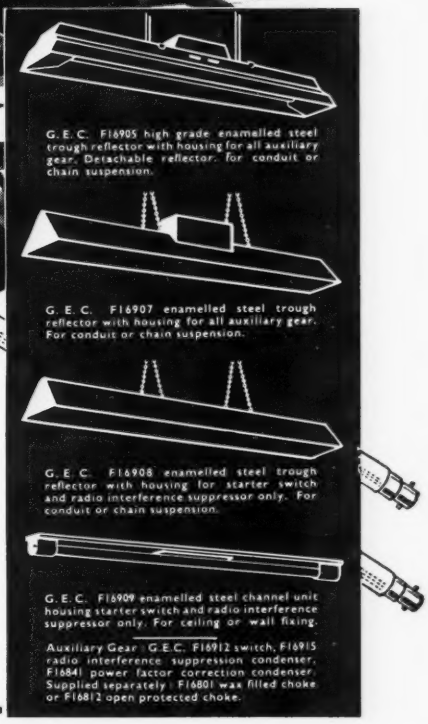
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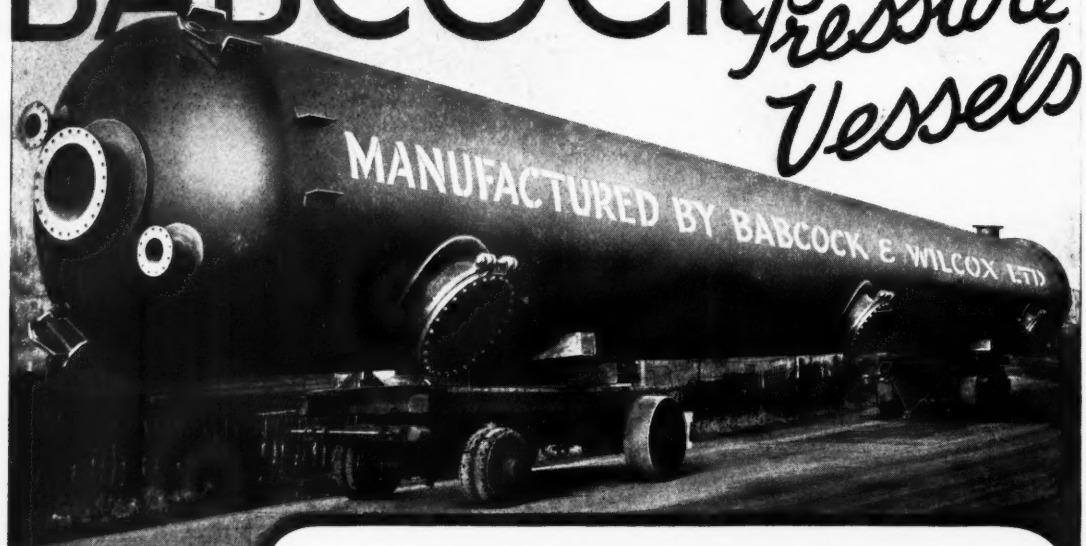

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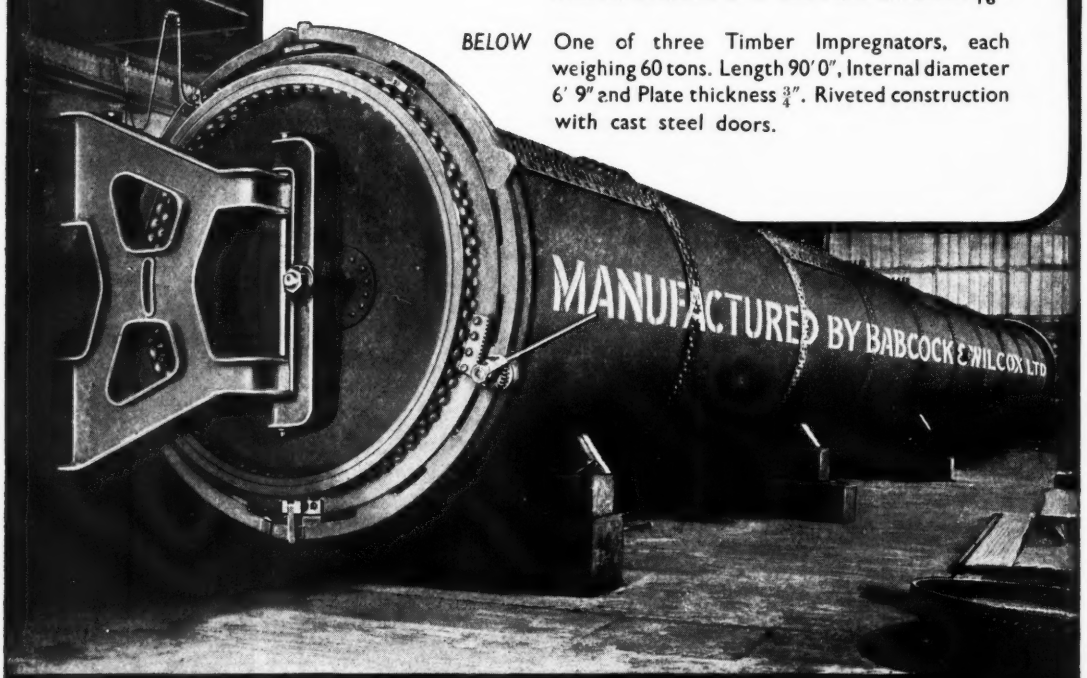

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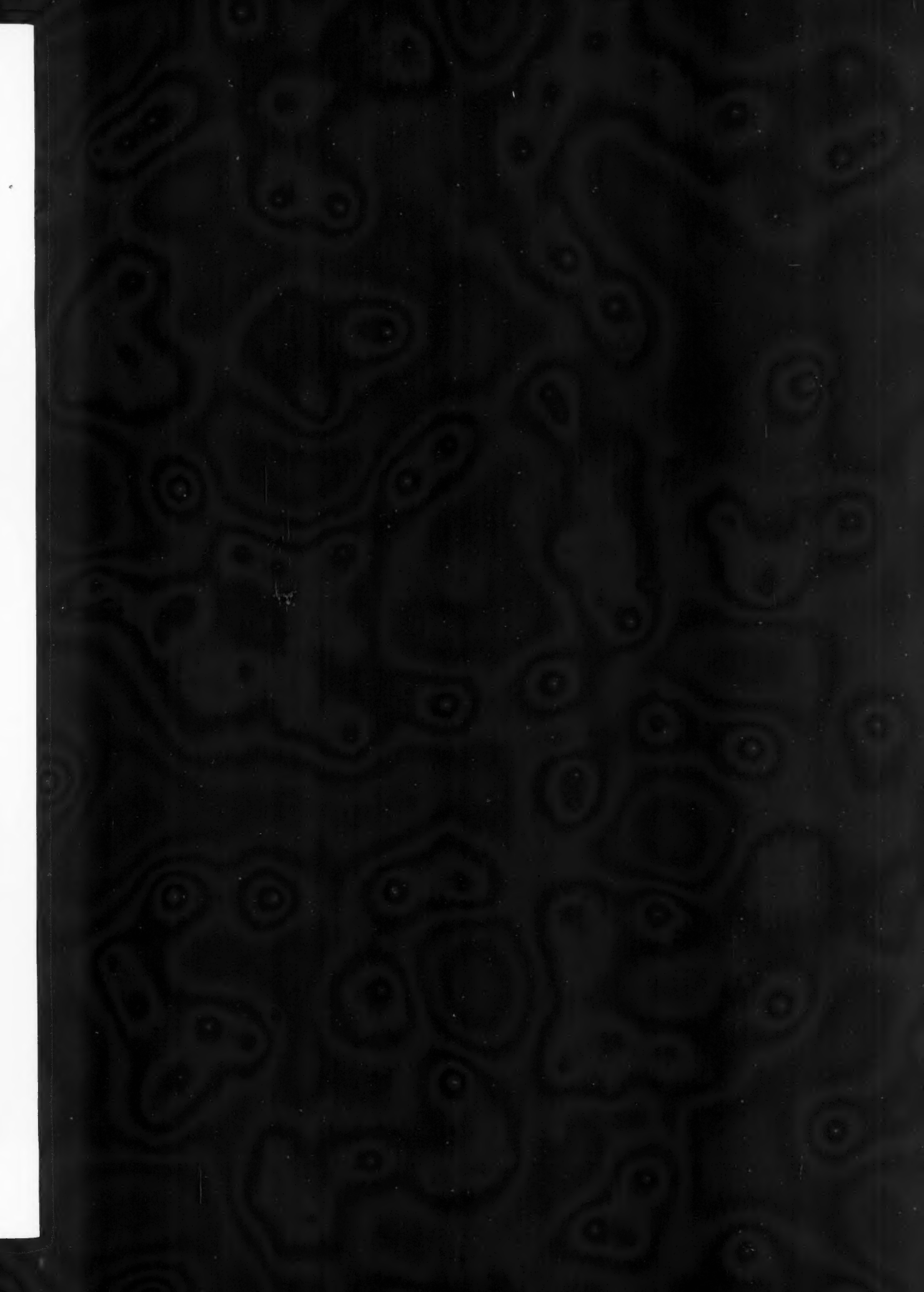

THE
ELECTRICAL REVIEW

Volume CXXVIII — No. 3321

Friday, July 18, 1941

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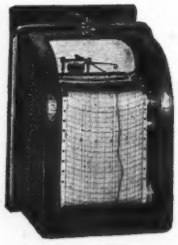

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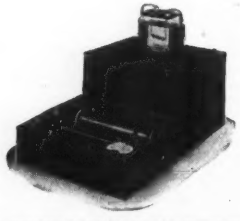

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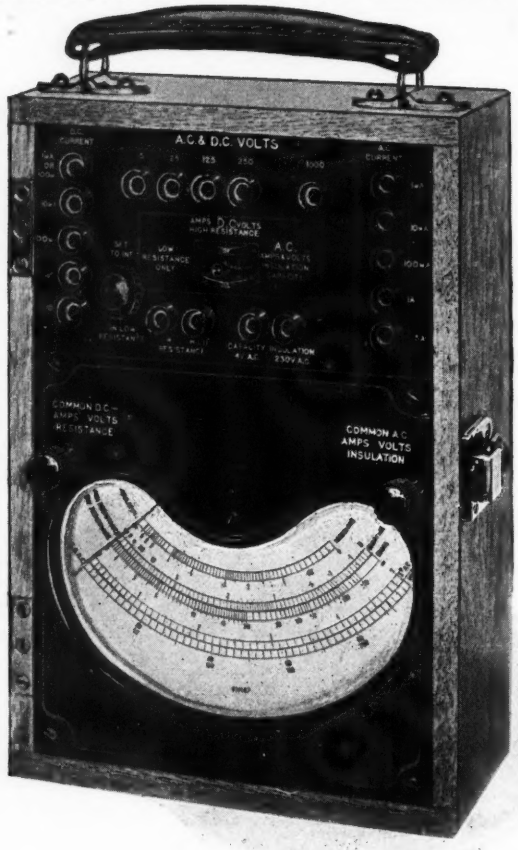

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3321 JULY 18, 1941 Price SIXPENCE

Chief Engineers' Salaries

Threat to Join the E.P.E.A.

IN last week's leading article we discussed the subject of the introduction of " trade unionism " in scientific and technical circles and in the same issue we published a letter from Alderman W. Walker drawing attention to the necessity forced upon the chief engineers of electricity supply undertakings to adopt a form of trade union.

Alderman Walker is well known to the industry, not only as a member of the Central Electricity Board, but pre-eminently as a champion of fair pay in the supply industry. He is an employers' representative in the National Joint Industrial Council and the National Joint Board for the Electricity Supply Industry and an outstanding example of the enlightened employer who looks out for the best men and believes in paying them properly. This naturally does not endear him to the more reactionary people on his own side of the fence (among them, we regret to say, being many staunch trade unionists), but he still persists in his obstinate course as his letter bears witness.

Standard of Remuneration

There is an unfortunate tendency among municipal authorities to regard borough electrical engineers in the same way as their clerical staff instead of as heads of (usually prosperous) productive undertakings. The correct " yardstick," however, is their market value, *i.e.*, what they would be paid by purely commercial concerns, due regard being given, of course, to the possibly greater security of tenure and superannuation rights.

Some years ago discussions between the chief engineers and representatives of municipal electricity supply authorities resulted in the drawing-up of a scale of salaries—appropriately named after Alderman Walker who took the lead. About half of the municipal undertakings adopted the schedule, and it was agreed that all questions arising out of it should be referred to a Standing Joint Committee, which, however, was never established.

In 1938 the constitution of a National Joint Committee and thirteen District Committees was announced for the purpose of making recommendations concerning the salaries and conditions of service of chief electrical engineers, including the preparation of a revised scale of salaries and conditions. It was found that the main point of disagreement arose from the desire of the supply authorities to differentiate between chief engineers of undertakings with their own power stations and those who did not have the responsibility of running a station. Another matter was the " devaluation " of supplies to large consumers.

Alderman Walker stated in his letter that the National Council had unanimously reached agreement upon " formulæ " and gave details of the proposals which, he said, represented very material reductions in the existing scale. He commended the " statesmanlike attitude " of the chief engineers throughout the negotiations.

It would be thought that this sweet reasonableness on the part of the chief engineers would have met with a similar sort of reception from the other side, but Alderman Walker appears to anticipate trouble from the " die-hards among the employers." He goes on to assert that these will not be allowed to scotch the proposals and warns them that any refusal to recognise the arrangement will be met by the " chiefs " joining the Electrical Power Engineers' Association to gain direct contact with the employers through the National and District Joint Boards.

They have so far refrained from taking this step because the employers think that it would be undesirable for chief engineers to belong to the same trade union and sit on the same side of the Boards as members of their staffs.

Employers or Employees?

There is no doubt some force in the objection, but the " chiefs " have been placed in a very peculiar position by the refusal of some supply authorities to set up (or operate) negotiating machinery. In this matter they are as much " employees " as their subordinates and failing separate recognition they are entitled, if they wish, to throw in their lot with other employees. It may be worth while to point out that the E.P.E.A. already includes in its membership a number of deputy engineers who occupy far more important positions than some " chiefs " so that there would be nothing derogatory in the latter joining the Association.

The main objection, as we see it, is that it would leave the employers' side of the National and District Joint Boards composed entirely of municipal representatives who often cannot appreciate the employees' point of

view. In this respect the " chiefs " at present fill an important role—although for all practical purposes they are employers, they have been through the mill and are able to assess the value of the men and their work. This has probably been a principal reason for the harmony which has existed.

There may be some chairmen of electricity committees who would like to have it all their own way and would be prepared to view with equanimity the chief engineers joining the E.P.E.A., but this would undermine the industry's Whitley Councils and no good would come of it. We therefore hope, with Alderman Walker, that the " chiefs " will not be driven to taking a step which is likely to do more harm than good.

Salaries at Worthing

THE award by the Industrial Court of increases in salaries to members of the staff of the electricity undertaking was discussed at a recent meeting of the Worthing Town Council. The increases, which affect eleven employees, represent the enormous total of £302 per annum and one Councillor said that this matter " made a farce of local government." He wanted to know where equality of sacrifice came in when they had to make additions to the salaries of men earning over £300 a year. Another member spoke of protesting to the Chancellor of the Exchequer and described the conduct of the employees concerned as " despicable." Yet another suggested a reduction of staff to recover the increase, while the Mayor said that the public was being fleeced right and left. The Worthing Council is evidently one of those " diehards " referred to in our leader. Later it condemned a suggestion that it should take part in a county salvage drive and then some members created a fuss about the pension awarded to the Town Clerk. No doubt Worthing has been hit by the war, but we seem to recollect that the Council was much the same in palmier days.

E.D.A.'s Wartime Activity

PRESENT conditions make it undesirable that the principal slogan of the Electrical Development Association —" Use More Electricity "—should be overstressed. The idea is to get people to use the same amount of electricity to better purpose, and to this end the Association is taking a prominent part in the National Food Campaign. It has already distributed over 50,000 specially designed food charts to schools and public institutions, as well as hundreds o thousands of folders and booklets on the same subject. More intimate contact with the public is now being maintained by the conversion of electricity showrooms into Food Advice Bureaux, of which about two hundred have now been set up. Some details of the arrangements are given in this issue and we also publish some notes on the " Kitchen Front Clubs " instituted by Edmundson's Electricity Corporation at many of its 150 electricity service centres and branch showrooms. Although electricity will not be drummed into the people who take advantage of these facilities they cannot fail to be influenced by the environment in which they find themselves. In fact, as well as being a national service, this Food Advice Bureau idea is excellent electrical propaganda.

Oil to Producer-Gas

IN view of the present high cost of fuel oil, consideration has been given to running oil engines on producer-gas. Results obtained from the conversion of two generating units, recorded in the annual report of the Diesel Engine Users' Association, indicate that a material saving can be made in this way. Oil was used for five months and producer-gas for the subsequent seven months ending August, 1940. Allowing in the latter period for the operation of one of the engines on oil during week ends (this engine also using oil for ignition) the cost of fuel per kWh generated was reduced by about one-half. Oil (in the earlier months) was priced at £6 2s. 4d. and washed bituminous nuts at £1 4s. 7d. per ton. Overall economy was not of the same order, because labour costs were more than twice as much. To this great drawback under to-day's conditions must be added lowered capacity, which was from 670 to 450 kW in the case quoted.

H.P. Marine Auxiliaries

STEAM pressures at sea have not shown an upward tendency to the same degree as they have on land, although space considerations would appear to favour such a movement. For auxiliary service there has naturally been even less inclination that way on account of the relatively small size of the units. On a new vessel built for American Export Lines, the s.s. *Examiner*, not only are the propulsion turbines designed for an initial pressure of 1,200 lb. per sq. in. but also the turbines driving the two 350-kW generators which supply power for the auxiliaries. The latter are dual-pressure machines and will take steam at the pressure of the main boilers when the ship is in port and power is required for loading and unloading. The 1,200 lb. is, we believe, approximately twice the pressure previously employed for auxiliary sets.

I.E.E. Council

THE immeasurable debt owed by the nation to light-current engineering is aptly symbolised by the choice of Sir Noel Ashbridge as President of the Institution of Electrical Engineers from the beginning of next October. Although, no doubt, much of his recent work for the B.B.C. and for radio development generally may not be discussed now, we hope Sir Noel will be able to say enough to whet the appetite for those fuller details of achievement that can be divulged at the end of the war. The conferring of vice-presidential office on Professor S. Parker Smith implies a well-merited recognition of the work of technical colleges, e.g., by far the largest proportion of candidates for the A.M.I.E.E. examinations are, we believe, their products. Mr. E. Leete, it is pleasing to note, will continue to act as hon. treasurer. As a result of the ballot now declared, the vacancies for ordinary members of the Council will be filled by Lt.-Col. S. E. Monkhouse, strengthening the heavy-power element, Mr. E. B. Wedmore, who is identified with research, from the fruits of which the country is now benefiting, and Mr. S. E. Goodall (representing associate members), probably best known in connection with high-voltage switching and associated matters.

Income Tax

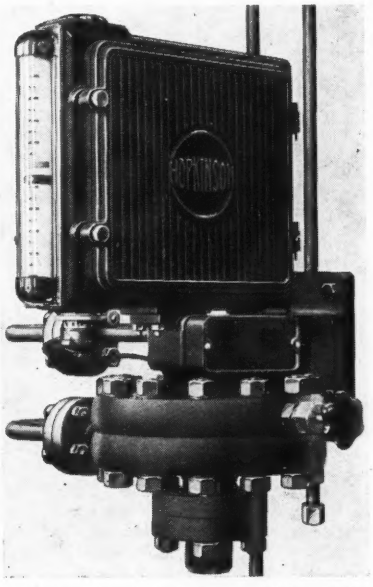
IT has been generally assumed that where membership of a technical institution is made a condition of employment, the amount of the annual subscription may be deducted from the salary when calculating the figure assessable for income tax under Schedule E, thus giving a rebate similar to that obtainable under Schedule D. This view was upheld by the Income Tax Commissioners in ruling in favour of a claim by a divisional engineer of the L.C.C. in respect of his membership of the Institution of Civil Engineers. An appeal by the Crown was, however, " reluctantly " allowed in the King's Bench Division, although if the subscription had been deducted by the L.C.C. from the salary of the official, the decision of the Commissioners would have been valid. As the latter seems a reasonable way of looking at the matter, it is to be hoped that there were unreported exceptional features in this case that would confine the scope of the judgment to an individual instance.

Boiler Economy—2

Recent Developments in Operation and Control

Our first article (July 11th) dealt with feeding arrangements for boiler coal, air and water. Next week we hope to cover the subject of accurate measurement of supplies and steam conditions

PROBABLY the first requirement in the economical operation and control of a boiler is reliable mountings and valves, and we feel that the position in this respect is satisfactorily presented in the following notes on the latest developments by Hopkinsons, Ltd. The most recent water level indicator is an accurate, sensitive instrument which can be read at a glance from considerable distances. It has a very wide angle of view (180 deg.) internal illumination and clear marking. It is operated directly by the movement of the water in the boiler, the operating element consisting of a sensitive diaphragm, one side of which is connected to the steam space of the boiler, and the other to the water space. The motion of the diaphragm is transmitted through a special form of lever mechanism to give a straight-line movement of the pointer along the scale, this movement accurately corresponding to that of the water in the gauge glass.



A water level indicator which can be read easily from considerable distances

The increasing use of high steam pressures has necessitated the development of suitable reducing valves for running existing lower - pressure plant from a new high - pressure system, and the company has installed numerous valves, both of the direct-acting type, operated by the high - pressure steam through relay valves controlled by the low-pressure steam, and the electrically operated type.

The reducing valve is of the balanced dolly type and the electrical controller, which may be conveniently mounted above the valve, incorporates the main motor control operating the reducing contacts. Operation is both sensitive and powerful, and the raising or lowering of the reduced pressure can also be effected, when desired, by means of push-buttons in the control room, thus enabling the reduced pressure to be varied in accordance with the load demand on the low-pressure turbine. The main operating motor is at the back of the controller and drives, through double reduction worm gear and a clutch, the main shaft which is connected to the handwheel and reducing valve. This motor is controlled by a contact system operated by a pressure bellows element which is connected to the low-pressure side of the system.

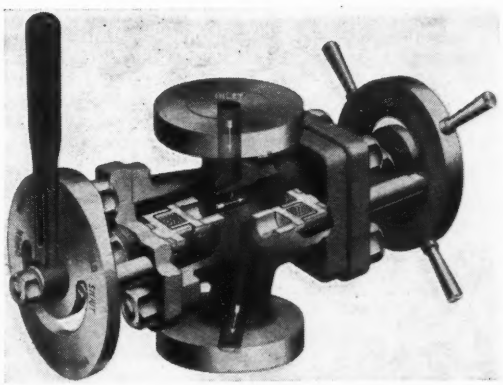
The "Hylif" safety valve, with full-lift operation, as distinct from the company's ordinary spring-loaded and high-lift types, has been introduced to provide a suitable valve of maximum discharge capacity for the modern high-duty boiler. When the steam pressure rises to the set value, the valve discharges with a small lift, on the principle of an ordinary safety valve. This initial opening allows the escaping steam to exert its pressure over the full area of the valve face and increases the lift until the face of the valve enters the valve guide, when the steam is deflected downwards by the edge of the guide and the consequent reaction pressure lifts the valve to its full-open position. At this final stage of valve lift, the discharge area between the seat and the valve equals the net area through the seat throat, and the discharge capacity has reached its maximum. When the discharge pressure has been relieved, the valve begins to close and as it emerges from the valve guide the reaction pressure ceases and the valve shuts down cleanly.

The avoidance of steam losses in high-pressure steam plants is a serious consideration, and to meet particularly arduous conditions, notably in drain service, the "Series Uniflow" valve has been evolved. This valve is particularly applicable, for example, when it is required to be in the "cracked" position for considerable periods, and where normally two drain valves arranged in series would be fitted. The unit comprises a master valve and a regulating valve in a single housing, and is designed so that the master valve must be fully opened before the regulating valve can be opened, and the regulating valve must be completely closed before the master valve can be closed.

This arrangement protects the master valve from any possibility of wire drawing and ensures perfectly fluid tight valve under the severest conditions. The sequence of operations is automatically controlled by a locking rod, and both the master and regulating valves operate on the slide-valve principle, which is characteristic of practically all the makers' stock valves for high-pressure duties. Owing to its compact design the "Series Uniflow" valve occupies no more space in the pipe line than a single valve of ordinary design.

Automatic Control

The outstanding development of recent years bearing on the economical operation of boiler plant has been automatic control, and there is already ample evidence to show that by its adoption considerable increases in thermal and overall efficiencies can result from a reduction of the lag between the operation demand and the response in consequence of the elimination of the human element.



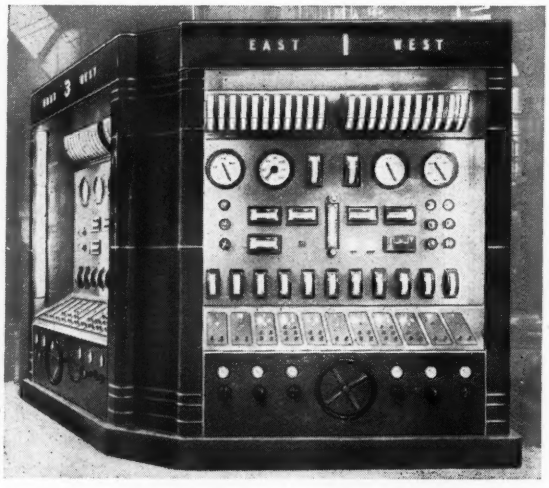
The "Series Uniflow" valve for particularly arduous conditions in high - pressure steam plants

The Electroflo automatic boiler control system has four main elements to perform the principal tasks in boiler operation, namely, the master controller, which determines the trend of the demand on the boiler as expressed by the steam pressure; the fuel regulator, which regulates the fuel feed; the air-flow regulator, which controls the air supply; and, when forced draught is used, the furnace draught regulator, which maintains the draught in the

combustion chamber constant at all boiler ratings. The master controller contains the steam pressure control element and is connected to the main steam header. It is fed with compressed air at not less than 5 lb. per sq. inch, and its function is to convert the measured steam pressure changes into equivalent air loading pressures for transmission to the loading diaphragms of the individual air and fuel feed regulators.

The steam pressure is measured by a diaphragm, the pressure on which is balanced exactly by the tension of springs when the steam pressure is at its normal value. The compressed air supplied to the system is led to an air chamber, from which it can leak off through a cup valve ; thus the air pressure depends upon the position of the cup valve, which is attached to one end of a pivoted weighbeam. The opposite end of the weighbeam is connected to the steam pressure element. The position of the cup valve is therefore determined by the relative movements of the steam pressure diaphragm and its control spring. There is an increase of air pressure with a decrease of steam pressure and vice versa. In other words, there is available in the air pressure chamber regulated by the cup valve a loading pressure which is always directly proportional to the boiler load. The distribution of the load is shown by one of the tubes of the fuel/air ratio indicating manometer. Alternatively, a third tube is provided.

From the air pressure chamber the loading air line joins a manifold where it is divided into two sections, one being connected to the fuel feed regulator loading diaphragm and the other to that of the air flow regulator. Each section is provided with an indicating manometer and a ratio valve, by means of which the proportions of the air pressures in the two sections may be adjusted at will. Alterations to the setting are readily made at the control panels without interference with the regulators. The air loading diaphragm exerts its influence on one end of a pivoted weighbeam, while the measuring device (air-flow measuring diaphragm or stoker speed element) exerts its influence on the other.



Alterations to the setting are readily made at the control panels without interfering with the regulators

When the control condition is constant the opposing forces are equal, but when there is a change in the boiler steam pressure the corresponding change occurs in the air loading pressure ; consequently the weighbeam is deflected and the restorative movement commences. The regulators are connected to the control means (fan vanes, motor rheostats, etc.) through suitable linkages by means of hydraulic or pneumatic power cylinders.

While in power stations and large industrial boiler-houses a high degree of accuracy is essential, in the smaller plants simplicity and ease of operation, combined with low first cost, are the qualities looked for. To meet these requirements the Hagan system uses two basic types of regulators which measure variations in the operating conditions, servo motors for acting on dampers, etc., and relays for manual resetting. The master pressure regulator responds to variations in the steam pressure, whereas a diaphragm type regulator is used for measuring the variations in draught, air pressure, or flow. They work in conjunction with servo motors, having double-acting, fully compensated power cylinders, and the power pistons take up definite positions for every value of the control pressure they receive, and which is sent to them by a regulator or relay. As an operating medium compressed air, oil, or water is used.

The control pressures sent out by the master regulator and varying in direct relation to the steam pressure, are conducted through ¼-in. bore piping to a servo motor controlling the fuel feed by the speed of the stoker, and to the regulator measuring the air flow as the draught loss across the boiler. Both the fuel and air are therefore regulated in parallel, and by the use of a suitable cam in the air flow regulator the required air-fuel ratio is maintained over the whole range of operations. The air flow regulator can only be in a balanced position when this air flow corresponds to the control pressure received from the master regulator. When this is not the case the air flow regulator will adjust the control pressure it sends out to the servo motor operating the induced draught fan vanes until this servo motor has taken up a position which opens the vanes to such an extent that the correct air flow is attained.

Forced draught is regulated from the furnace suction by means of a regulator and a servo motor acting on a damper in the forced-draught duct. This control also takes care of the varying conditions in the fuel bed. When, for instance, the resistance of one stoker increases, then the corresponding damper will be opened so far as is necessary to establish the required air flow. By means of relays mounted together on a control panel and fitted in the control pressure piping it is possible to make an adjustment to the control pressure on the down stream side of the relay, and so to add or subtract a required pressure to or from the control pressure received from the regulator, with the advantage that manual adjustments can be made to the relationship between the steam pressure, fuel feed, air flow and draught.

For the automatic maintenance of a constant steam superheated temperature the thermostat used is based on the different thermal expansion of metals. It controls a servo motor which, in turn, operates an attemperator valve, a water injector nozzle or a gas damper by-passing part of the superheater.

Feed Water Control

A modern feed water control installation consists of regulators of a type similar to those used for combustion control, but sometimes it is an advantage to include pressure and temperature control of the feed water. Elliot remote automatic control equipment is available in two forms—" On-off " control and " floating" control and, although the following notes are based on their applications to water pumping, the principle of operation is obviously applicable to all, or most, boiler-house operations.

On-off control is the simpler system, and provides automatic starting of the pumping set, or other distant equipment, at a pre-determined low level and automatic stopping at a set high level. Control of the pumping set is effected by means of a high-torque moving-coil instrument fitted with adjustable high- and low-level contacts, which is operated by the distant water level transmitter. Two auxiliary control relays interposed between this instrument control relay and the motor starter are of a type which renders chattering of the motor starting contactor impossible. In the event of open-circuiting or short-circuiting of the pilot wires or failure of the AC supply to the transmitter, the automatic control equipment would immediately start the pump and the latter would continue to run indefinitely. This is prevented by an additional protective relay, which interrupts the power supply to the pump motor. Resetting is automatic on the resumption of normal conditions.

When two or more distant pumping sets are provided the remote control can be arranged to start an additional pump if the level continues to fall. If the demand increases so that it comes within the capacity of a single pump the second pump is automatically shut down. On-off control is suitable for plants where the rate of change of water level is slow, but where changes of level are rapid, as in the case of balancing tanks, the system of control may impose a severe duty on the motor and starter and, if supplies are given from

the pumping main, the pressure surges resulting from starting and stopping may be objectionable.

Such difficulties may be avoided by the floating control system. With this system the speed of the pump is varied automatically in accordance with the demand, which is gauged by the level in the distant tank. The pump may be driven by a variable-speed AC or DC motor, or a constant-speed motor driving through a variable hydraulic coupling. Alternatively, the control may be applied to steam-driven pumps, the control then operating on the throttle. The arrangement of the control is such that when the tank is full the pump delivery is zero. In the case of centrifugal pumps delivery ceases when the pump head is equal to the static head ; the speed corresponding to this point is usually in excess of half speed. Assuming the tank is full the pump delivery will be zero. A demand for water lowers the level, and the control automatically starts delivery at a low rate from the pump. If the demand is such that the level continues to fall, the pump speed is increased progressively until the 80 per cent. full level is reached, when the pump runs at full speed.

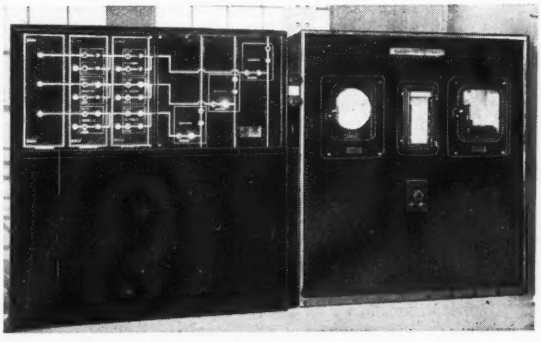
Unified Control System

In the Metrovick system of unified boiler control each boiler is provided with a generator set connected to the various fan, feed pump and stoker motors, the fields of the motors being supplied from the exciters coupled to the motor generator. The ratios of the speeds are controlled by adjusting the field rheostats and the actual speeds are fixed by the voltage supplied from the generators. All the generator fields are supplied from the exciter busbars and if it is desired to raise or lower the steam production of the boiler, the field rheostat of the generator is adjusted, altering the terminal voltage of the generator. The excitation busbars are fed from a small exciter set connected to the station battery and complete control of the output of the boiler can be achieved by adjusting the voltage of this small exciter set.

While it is possible for the fireman to adjust the induced and forced draught fans so that the furnace is burning with the best possible air and fuel distributions, in order for the combustion engineer to raise the steaming of the boiler it is not necessary to alter the setting of the individual fan motors but only to adjust the field rheostat on the generator.

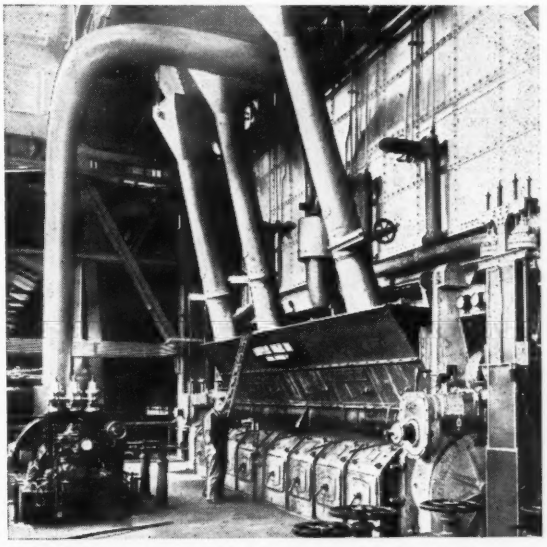
Finally, to raise the steam capacity of the entire plant it is possible to raise the voltage on the excitation busbars, thus increasing the steaming of the whole station. The usual method of operating a boiler house containing, for example, a bank of two boilers, is to operate one boiler on normal economic rating, at which the efficiency is at maximum, while the other boiler is used for regulating purposes and may fluctuate anywhere between maximum continuous rating and 20 per cent. load. This means that for long periods the regulating boiler may be operating on the steep part of its efficiency curve, and consequently at a comparatively low efficiency.

It is necessary to use one boiler for regulating purposes because of the large number of controls involved, and the difficulty of altering all these controls on the entire bank of boilers. With the unified control, the steaming of both boilers can be changed simultaneously and therefore the amount of variation is reduced to one-half with the result that both boilers can operate over the flat portion of the efficiency curve in the region of its highest point.



Illuminated control board for powdered fuel system and (right) main automatic combustion panel at a large station

The energy consumption of the fan drives in the unified control system is considerably lower than in other types of drive. Although the DC motor is found to have a slightly lower efficiency than the normal squirrel-cage machine, it is usually necessary to operate boiler fan motors at substantially reduced speeds under normal conditions so as to have sufficient margin for overloads, and to cope with a " sooted-up " condition in the boilers. Even though two-speed AC motors may be employed, it is extremely difficult to estimate what the low speed should be and practical experience indicates that the energy losses on AC fan drives in boiler-houses are usually very considerable. The control system under review allows infinitely variable adjustment to be obtained from creeping speed up to full output with the minimum of energy loss.



Unified boiler control is now operating in this large reconditioned power station; 210,000 lb. per hour, 2,000 lb. per sq. in. Loeffler boiler and steam circulating pump

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editor cannot accept responsibility for correspondents' opinions.

Association of Scientific Workers

THERE can be no doubt that under present conditions scientists and engineers are becoming more and more ordinary employees of large firms and trusts and the individual status which they have enjoyed for such a long time is being gradually eliminated. This results in their work being carried out purely in their employers' interests and any inventions are exploited or suppressed as economic conditions or vested interests decide, instead of being applied towards the interests of the people as a whole.

Unless a scientist or an engineer is economically independent he has no opportunity of conducting independent research or experiment. This, of course, has applied in the past, but the opportunities are gradually becoming fewer. This means that scientists and engineers must adopt a realistic attitude towards present conditions and appreciate that only by building up the existing trade union organisation can they hope to safeguard and improve their economic position. Scientists and engineers of all ranks occupy a unique position in present-day society and they must realise that their main object is to serve the people as a whole. To do this they must be prepared to consider themselves as part of the people and not a class to themselves.

In the new order which we hope will arise from the present holocaust, scientists and engineers will play an even more important part than they do in the present order, in fact it can be said without contradiction that they will play the most important part. This reconstruction of society, as well as of towns and industries, must be done according to a scientific plan and, therefore, scientists and engineers must prepare, by collaboration and organisation, for that desirable time when it comes in the not-too-distant future.

Manchester. A. G.

PERSONAL and SOCIAL

News of Men and Women of the Industry

OLDHAM Electricity Committee has agreed that the superannuation payable to **Mr. F. L. Ogden,** electrical engineer and manager of the electricity undertaking, is £516 per annum from August 1st. It is proposed that **Mr. R. G. Whitehead,** chief assistant engineer and manager, and **Mr. E. Binns,** station engineer, who are appointed joint chief electrical engineers and managers, shall receive £1,000 per annum, plus any bonuses. The post of assistant engineer and manager is not to be filled.

The appointment of **Mr. T. H. Carr,** A.M.I.E.E., M.A.Min.E.E., of Derby, as deputy electrical engineer and manager at Bradford has now been confirmed by the Bradford Corporation. Mr. Carr received his training with John Spencer & Sons, Ltd., and Sir W. G. Armstrong Whitworth & Co., Ltd., and subsequently held appointments with A. Reyrolle & Co., Ltd., Merz & McLellan, the North-Eastern Electric Supply Co., Ltd., and the National Boiler & General Insurance Co., Ltd., before going to Sheffield as chief constructional engineer with the Corporation Electricity Department. In 1938 he joined the Derby Corporation Electricity Department as technical assistant to the borough electrical engineer, and in June last year was appointed power station superintendent there.

Mr. T. H. Carr

Mr. A. P. Biggin, consumers' superintendent to the Chesterfield Corporation Electricity Department, is to retire on pension.

Mr. W. L. Barber, founder of the Midland Electric Manufacturing Co., Ltd., in 1908, has been appointed chairman in succession to the late Sir C. Herbert Smith. Mr. Barber will continue to act as one of the joint managing directors. **Mr. E. Withington,** a member of the board, has been appointed deputy chairman.

Mr. Eric O. Taylor, B.Sc., A.M.I.E.E., has been appointed to the senior lectureship in electrical engineering at the Heriot Watt College, Edinburgh, as from September 1st, 1941. Mr. Taylor, who is thirty-nine, is a Yorkshireman and received his practical training with the British Thomson-Houston Co., being later in the Technical Department of the Central Electricity Board. He has held laboratory and teaching appointments at the City and Guilds Engineering College, in addition to part-time lectureships at other technical institutions.

The Belfast Corporation has approved a recommendation of the Tramways Committee that an honorarium of £300 be given to **Mr. S. Carlisle,** acting general manager of the tramway undertaking in the absence of Col. R. McCreary, D.S.O., serving with the Royal Engineers, and that one of £200 be granted to **Mr. J. Mackie,** acting deputy manager, in respect of their special duties in a very trying period.

Prof. C. O. Bannister is to retire from the Liverpool University Chair of Metallurgy, which he has held since it was founded in 1920. Prof. Bannister has done great work as Dean of the Faculty of Engineering and chairman of the Society of Chemical Industry.

Mr. J. E. Rawson has taken up his duties as electrical engineer at Todmorden in succession to **Mr. E. Brunt,** who has retired after twenty-one years' service. Mr. Rawson served his apprenticeship in the Hebden Bridge U.D.C. Electricity Department and was appointed shift engineer at Todmorden in 1915, subsequently becoming mains superintendent, a position which he has held for the past twenty-one years.

Mr. E. J. R. Kay, B.Sc., A.M.I.E.E., of Hitchin, and **Mr. D. M. Bishop,** B.Sc., A.M.I.E.E., of Portsmouth, have been appointed mains assistants to the Bedford Corporation.

Mr. J. S. Peck, chief electrical engineer of the Metropolitan-Vickers Electrical Co., Ltd., retired at the end of June. He is succeeded by **Mr. G. A. Juhlin,** whose appointment dates from July 1st.

Mr. W. M. B. Furniss, who has been with the Electric Construction Co., Ltd., for sixteen years, has recently been appointed assistant manager at the company's Bushbury Works, Wolverhampton.

Mr. E. Hitchcock, general manager of the Christchurch (N.Z.) Electricity Department, has been appointed a member of the Local Government Loans Board for one year from April 1st, 1941.

Obituary

Mr. John Needham, formerly managing director of the Northern Steel & Hardware Co., Ltd., Manchester, and associated with Crompton, Parkinson, Ltd., died on July 4th at Manchester. Mr. Needham was a past president of the Manchester Radio and Electrical Club.

Mr. E. Kilburn Scott—We regret to learn, as we go to press, of the death of Mr. Ernest Kilburn Scott, M.I.E.E., A.M.Inst.C.E., which occurred on July 12th, at the age of seventy-three.

Mr. R. H. Cridge.—We regret to learn of the death of Mr. Ralph Henry Cridge, B.Sc.(Eng.), which occurred on July 1st in St. Bartholomew's Hospital, at the age of fifty. Mr. Cridge was on the staff of the City Engineer's Department of the Corporation of London, and had previously been attached to the staff of the Madras office of the English Electric Co., Ltd.

Mr. P. H. Stevens.—We regret to announce the death, which has occurred in a Northampton nursing home, of Mr. Percy Herbert Stevens, a director of the Express Lift Co., Ltd., one of the associated companies of the General Electric Co., Ltd. Mr. Stevens had for nearly fifty years been connected with the Express Lift Co., and its amalgamated company, Smith, Major & Stevens, Ltd., and was one of the country's foremost lift engineers. He was also a director of the Law Land Co., and for many years took an active interest in the affairs of the Lawn Tennis Association of Great Britain, of which he was a past chairman. He leaves a widow, a son, who is a captain in the army, and a married daughter.

Herr C. F. von Siemens.—The death occurred on July 10th, at the age of sixty-eight, of Carl Friedrich von Siemens, the German industrialist and head of the Siemens-Halske Works, which he inherited from his father. He developed the business into one of the biggest industrial concerns in Germany, creating for his factories and workmen on the north-eastern border of Berlin an entire city called Siemensstadt. A *Reuter* dispatch says that von Siemens studied in Berlin, Strassburg and Munich, and spent two years in America, London and Paris before joining his father's firm. He was again in London in 1901 to 1908 as head of the " high power " department of the company. He served on the Western Front at the beginning of the last war but was recalled by the Government to reorganise his works into plants for the production of war material. In 1920 he was elected a member of the Reichstag on the democratic list, but relinquished his seat in 1924, when he became chairman of the German Railway Company.

Mr. Thomas Croshaw, of Landywood, Cannock, whose death has occurred at the age of seventy-five years, was a well-known master chandelier maker, and had for more than sixty years been associated with F. and C. Osler, Ltd., electrical fittings manufacturers. Mr. Croshaw, who retired three years ago, was a member of the Brass Workers' Association, and had carried out interior decoration at Buckingham Palace, Westminster Abbey, and Windsor Castle.

Mr. J. Ward.—The death has occurred at Sheffield of Mr. Joseph Ward, chairman and managing director of Thos. W. Ward, Ltd. Mr. Ward was a Sheffield town trustee and a former Master Cutler.

Mr. H. G. Gilliland.—The death occurred on July 7th of Mr. Horace Gray Gilliland, M.C., A.M.I.E.E., late captain Loyal N. Lancs. Regiment.

Community Feeding at Erith

SINCE the war started Mr. E. A. Logan, the borough electrical engineer and manager of Erith, has taken on an additional job, that of borough catering manager. For some months he has been responsible for the feeding arrangements of several schools and a few days ago the first of a series of five or six community restaurants for the general public was opened at the Baptist Church Hall, Belmont Road. Here for the modest sum of 10d. a substantial and well-cooked two-course lunch is available for anyone who cares to have it and while the scheme has been started as a wartime expedient there can be no doubt that housewives will welcome the continuation of the scheme when peace returns. Accommodation, with an attractive colour scheme of pale green, is provided for 500 and although very little publicity has been given to the canteen already 200-250 persons a day are taking advantage of it.

Cooking is carried out by a bank of four standard G.E.C. " DC 735 " cookers and four Burco wash-boilers. As each of the cookers is rated by the manufacturers as being suitable for seven to nine persons the economy of the arrangement will be apparent. Three of the boilers are used for cooking vegetables, stews, etc., while the fourth supplies hot water for washing up, Mr. Logan preferring it to a self-contained water heater for this purpose owing to the fact that the canteen staff can see more easily how much water is available. The last boilers to be ordered have been specially designed with circular lift-out lids instead of flaps and removable wire basket containers. To assist in the preparation of the food a Hobart mixer and potato peeler dealing with 28 lb. of potatoes at a time have been installed, while to keep the plates warm there are two rows of tubular heaters (with a total loading of 2 kW) placed under the serving counter.

For the school feeding the Council has four other canteens in operation serving about 1,000 children a day, and the number will probably before long be 1,500. For these centres similar apparatus to that used in the public restaurant is used, plus a " Hallmark " freezer for making ice-cream, which as can be imagined, is much appreciated by the schoolchildren. As the canteens do not in all cases adjoin the schools, use has been made of cork-lined heat-insulated containers for the distribution of the food. The ease and speed with which an electric canteen arrangement of this kind can be brought into service can be judged by the fact that in one case, although the Catering Department was only informed on a Thursday evening of the need to provide a canteen, it was able to serve some 200 meals on the following Monday.

Visual Null Indication

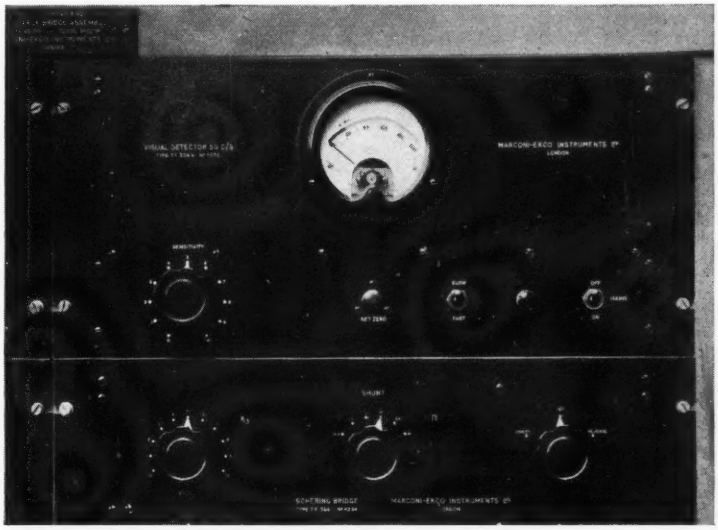
New 50-cycle Instrument for Cable Measurements

By C. F. Brockelsby,
A.R.C.S., B.Sc.

A design worked out for the purpose of eliminating the drawbacks associated with the vibration galvanometer

THE great majority of routine and research high-voltage measurements on cables, dielectric specimens and condensers are made by bridge methods. These necessitate the use of a null detector, of which the only type in common use is the vibration galvanometer. Now that accurate standards of capacitance and power factor and simple, reliable bridge equipment can readily be obtained with almost any desired standard of precision, the null indicator is the weakest link in the chain, and its performance sets a limit to the accuracy realisable in research measurements and to the speed of routine measurements.

Difficulties and limitations associated with the vibration galvanometer when used for measurements of high precision may be listed under several heads, as follows:—



The new detector—rack-mounted form

Installation.—The galvanometer must be protected from mechanical shock or vibration, so that a special mounting pillar is required. In order to make the spot plainly visible, it is usually necessary either to darken the laboratory or to use a light tunnel. The latter expedient is perhaps more commonly adopted, and together with the special mounting makes it very difficult to change the position of either the galvanometer or the operator.

Maintenance.—The Schering galvanometer, which is probably the type in most common use, is tuned by varying the polarising current, and batteries to supply this must therefore be maintained.

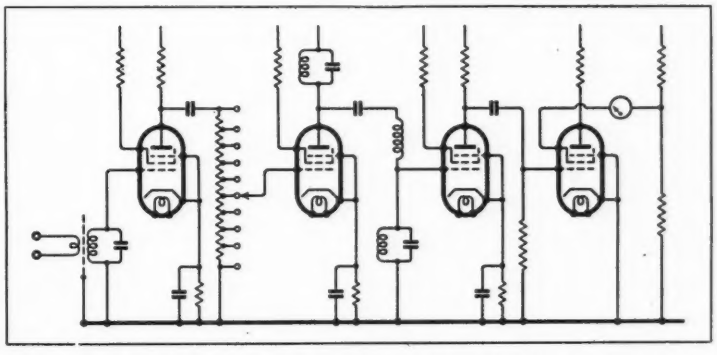
Performance.—Two essential properties of a null indicator at 50 cycles per sec. are high sensitivity and high selectivity; the latter is necessary because the bridge balance will be imperfect at frequencies other than 50 cycles, and any harmonic components of the test voltage will therefore be greatly magnified. In the vibration galvanometer these properties are both obtained by mechanical resonance, and their numerical values are therefore both dependent on the damping coefficient. When this is such that the response at 150 cycles is 1/1,000 of that at 50 cycles (a necessary condition for some measurements) the response when mistuned by only 1/10 cycle falls by about 30 per cent., while at 1 cycle off tune it falls by 93 per cent. Very accurate tuning is therefore essential, and changes in the test frequency, so minute as to be negligible by other considerations, produce appreciable changes in deflection. Under the same selectivity condition, the time for the deflection to assume 90 per cent. of its final value is a little over half a second. A further consequence of the small damping is that when the tuning is slightly in error any abrupt change in input (such as is produced by moving the bridge controls) produces a damped fluctuation of the spot amplitude, due to the beating of the free and forced oscillations of the coil. An immediate and definite response to a change in input is obtainable by increasing the damping, but this is inevitably accompanied by loss of both sensitivity and of selectivity.

The maximum sensitivity obtainable is inadequate for measurements at low voltages, and for work where small changes in capacitance and power factor are important. In an attempt to overcome this serious limitation, thermionic amplifiers have been used between the bridge and the galvanometer. These efforts have met with varying success, and it has often been found that the increased sensitivity is accompanied by an increase in instability and in interference due to stray fields, so that the net gain is disappointing. Some engineers have even found it necessary to exclude all conductors carrying 50-cycle current (except the bridge leads) from the measuring laboratory. In any case, the amplifiers require batteries for their power supplies, with the attendant inconvenience of maintenance.

The galvanometer is by nature somewhat delicate, and can, for example, easily be damaged by grossly unbalancing the bridge. A certain amount of skill, care and training is therefore essential in the operator. This is perhaps even more necessary because there is a personal element in estimating the precise balance point with a vibration galvanometer when the sensitivity required is near the maximum obtainable.

In the light of the above considerations the desirable features of a null indicator, which shall be an improvement on the vibration galvanometer, can be enumerated. The maximum sensitivity should be ample for the most difficult measurements, and capable of variation down to a low value without affecting any other part of the performance. The selectivity should be adequate, a response of 1/1,000 at 150 cycles being satisfactory. The selectivity should be independent of the sensitivity, and the curve should have a flat top so that small changes in frequency do not produce any appreciable change in deflection. The time of response to a change of input should be small and independent of the sensitivity.

The actual indicator should be a robust pivoted pointer-type instrument, permitting the use of an extension meter at any desired place and reducing the personal error. The complete instrument should be unaffected by mechanical shock or vibration, and automatically protected from damage by overload. It should be stable and free from interference from 50-cycle and other stray fields. No batteries should be required, any power supply necessary being derived from the mains, preferably by built-in equipment.



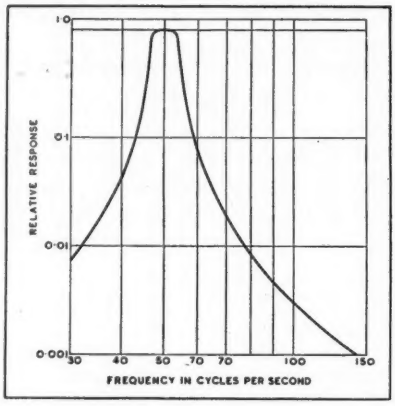
Schematic circuit diagram. (Decoupling and supply circuits omitted for clarity)

Some of the above features tend to be mutually exclusive; for example, every increase in sensitivity is accompanied by an in-

creased liability to interference. In the design described below, it is believed that a satisfactory compromise has been achieved.

The new instrument is not novel in principle, consisting essentially of a valve amplifier of high gain followed by a valve voltmeter. The detector is mounted on a rack, which also supports a Schering bridge and other equipment. The input and mains connections are made by means of plugs at the rear, so that it is easy to remove the detector. The input connections are taken to a triple-screened astatic screened and balanced transformer presenting an input impedance suitable for connection to the Schering bridge and supplying the grid of the first valve. The heater of this is energised with DC derived from a metal rectifier.

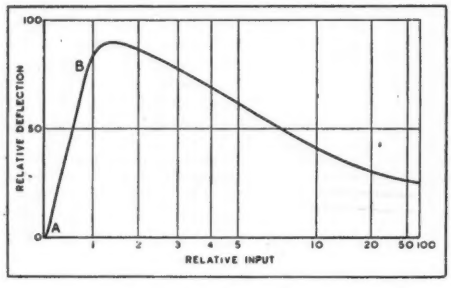
Sensitivity control takes the form of a tapped potentiometer between the first and second valves; ten settings (in addition to an "off" position) are provided, eight steps of 3.16:1, one of 5:1 and one of 10:1. The maximum sensitivity gives a deflection of approximately five divisions per microvolt (each division is about 1.5 mm. long). This figure in itself is not very informative; the corresponding sensitivity to changes of power factor and capacitance under working conditions is deduced later. An idea of the sensitivity can be had from the fact that the voltage induced in a single-turn search coil of 1 cm. radius by a 50-cycle field of 1 gauss produces a deflection of five divisions.



Selectivity curve

The second and third valves are coupled by a properly terminated screened band-pass wave-filter, which gives a uniform response over a band of about 5 cycles per sec. centred at 50 cycles, with a response of 1/1,000 at 150 cycles. The input transformer is flatly tuned to prevent overloading of the first two valves by harmonic voltages. The third valve is resistance-coupled to the fourth and last, which functions as a grid rectifier. The circuit is arranged so that the steady current through the indicator meter can never exceed the full scale value.

Over the normal working part of the range (AB on the response curve) the scale shape is linear; and since the scale of the abscissæ depends on the sensitivity control setting, this part of the curve can be made to embrace all input voltages encountered in practice, even under conditions of extreme unbalance. Increase of input beyond B produces a flat maximum deflection and then a gradual fall. An attempt to balance the bridge on this part of the curve would, of course, give a divergent balance, but the condition is unmistakable because of the small change in indication produced by very large changes in the bridge settings, and is always avoided if initial adjustments are made with a low sensitivity. This form of curve has been found a very satisfactory one for use in bridge detectors to be handled by semi-skilled personnel.



Response curve

All the power supply equipment is contained within the instrument, and operates from the 50-cycle mains. The mains transformer core has a low flux density and ample smoothing equipment is fitted, with the result that the indicator deflection due to internal 50-cycle interference is imperceptible, being equivalent to an input voltage certainly less than 10^{-7}V. The internal screening gives practical immunity from all 50-cycle fields likely to be met in the laboratory; a field of 100 gauss produces a just perceptible deflection. The stray fields due to wiring carrying 50-cycle currents are not likely to exceed 10 gauss, and it is safe to assume that the detector will not be mounted in very close proximity to a large transformer or machine.

The narrow band of frequencies to which the indicator responds makes it insensitive to thermal agitation and shot noise. Their combined effects produce an equivalent input voltage of the order of 10^{-7}V. For the same reason, microphony in the valves of the amplifier is unimportant, and the ordinary vibration found in the laboratory produces no effect. Rapping the panel of the detector smartly with the knuckles produces a temporary deflection which dies away in a fraction of a second. The remaining source of interference is electrical shock excitation, resulting from abrupt changes in input due either to movement of the bridge controls or discharges from the high-voltage busbars. The narrow band width effectively suppresses the latter, and the terminations of the band-pass filter are adjusted to suppress the large surges which might be produced by the former.

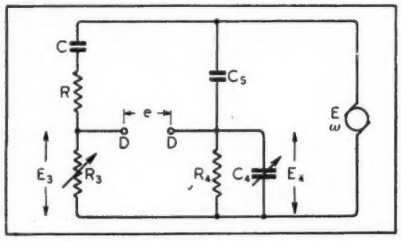
The time constant of the indicator is about 0.2 sec., with approximately critical damping. In practice this means that the indicator moves immediately and without overswing in response to a change in the settings of the bridge controls. The time constant is mainly controlled by that of the grid-detector circuit and can therefore easily be increased. Since sensitivity, selectivity, and time constant are controlled by separate parts of the circuit, they are essentially independent of each other.

One of the most important advantages of the new detector is its sensitivity. A sufficiently approximate value for the power factor and capacitance discrimination obtainable in practice is easily calculated as below. Consider the simple Schering bridge circuit shown, in which DD are the detector terminals. In the normal case $R_3 \ll 1/\omega C$ and $R_4 \ll 1/\omega C_5$.

For capacitance discrimination let $R = 0 = C_4$; then $E_3 = R_3\omega CE$ and $E_4 = R_4\omega C_4E$.

At balance $E_3 = E_4$; for a small unbalance corresponding to a change from R_3 to $R_3 + \triangle R_3$, $e = E_3 + \triangle E_3 - E_4 = \triangle E_3 = \triangle R_3 . \omega CE$, $\therefore \frac{\triangle R_3}{R_3} = \frac{e}{E_3} = \frac{e}{E_4} = \frac{e}{R_4\omega C_5E}$. In the normal Schering bridge $R_4 = 1000/\pi$ ohms, and $\frac{\triangle R_3}{R_3} = \frac{e}{10^5C_5E}$. The same unbalance will be produced by an equal fractional change of capacitance, $\triangle C/C$.

When the detector is connected, e will be reduced and the new value can be calculated by means of Thévenin's Theorem. The impedances are approximately matched so that the voltage applied to the detector is approximately $e/2$. For a deflection of one division, at maximum sensitivity, e must be 0.4×10^{-6}V.



Simple Schering bridge

Inserting this value, the fractional change of capacitance required to produce one division is given by $\frac{\triangle C}{C} = \frac{\triangle R_3}{R_3} = \frac{4 \times 10^{-12}}{EC_5}$.

When the capacitance balance is maintained, but tan δ is changed by a small amount $\triangle$tan δ, E_3 and E_4 remain essentially equal in amplitude but differ in phase by an angle $\triangle$tan δ. By a similar argument to the above, the change of phase defect angle ("power factor") required to produce a deflection of one division can be shown to be given by the same expression as $\triangle C/C$, so that $\frac{\triangle C}{C} = \triangle\tan\ \delta = \frac{4 \times 10^{-12}}{EC_5}$ for one division deflection where E = test potential in volts and C_5 = standard capacitance in farads. For example, when making a measurement at 10 kV with a standard capacitance of 50 $\mu\mu$F, the smallest perceptible change of capacitance will be about 0.001 per cent. and of p.f. about 0.00001. In practice these values are too small to use, and the final balance would be made with the sensitivity of the detector well below the maximum. The full sensitivity has only been used in measurements at about 500 V with small standard capacitances.

The value of the ultimate discrimination, calculated as above, is subject to an error of about three times in either direction. In particular, a value about one-third of the above is actually obtained when a heavy-current shunt is used in a five-arm bridge network, while the value is in very little error for the four-arm bridge.

The value of the *unknown* capacitance does not appear in the expression for the discrimination. This arises from the fact that E_3 is adjusted (by means of R_3) to make $E_3 = E_4$ when the bridge is balanced, and E_4 depends only on the *standard* capacitance and the test voltage. This is for the Schering bridge in which R_4 is fixed, but a similar calculation can be made for less common networks.

I am indebted to Marconi-Ekco Instruments, Ltd., for permission to publish the results of work undertaken in their laboratories, and to Dr. J. G. Brazier and Dr. A. N. Arman of Callender's Cable and Construction Co., Ltd., for their collaboration and the testing of the experimental models over a period of two years.

Photo-Cells in Industry

Examples of Ingenious Design

This article briefly describes a few of the great number of light-operated instruments now available

THE use of the electron emission from a photo-sensitive surface when light falls upon it has been of immense value in physical research and in practical photometry; it is the basis of sound reproduction in motion pictures and the keynote of picture-telegraphy and television; and it is widely utilised in engineering and industry.

The photo-conductive type of cell used for the telegraphic transmission of photographs in the earlier systems, for automatic light buoys, street lighting control and many types of counting machine, is based chiefly on the change in resistance of selenium in a certain physical form when exposed to light. More extended use has probably been found for the oxidised thallium sulphide photo-conductive cell developed by the Case laboratories.

The photo-voltaic (barrier layer) type of cell, an early example of which was the copper-oxide on copper type used by Lange in his illumination meters, is most representative of cells used to "do things" in industrial work, owing to its relatively large current output for a given amount of light received. Tungsram, Eel and Weston "Photronic" cells are typical examples. In most of them selenium which has been sensitised by improved processes has reappeared.

The following tabulated output figures are approximate only, and apply to circuits of small external resistance. The Tungsram Co. states that in its case the output in microwatts is a function of external load resistance, the maximum output being obtainable when the external resistance of the circuit is two-thirds of the internal resistance.

Photo-cell	*μA per lumen*
Eel selenium cell	570
Tungsram "S"	460
Salford	230
Weston "Photronic" ..	110
Super-sensitive caesium ..	40
Potassium vacuum type ..	0.5

The photo-electric cell, the third type, is of more value in detecting light fluctuations of high frequency owing to its complete lack of inertia and lag, though the output is comparatively small, as instanced by the last two items in the above list. Photo-electric cells generate proportional currents at very low illumination levels, so that with their rapid response they have been largely adopted for television purposes, sound reproduction in talking pictures and facsimile transmission. The considerable amplification needed is most easily done with AC (DC introducing annoying features) so that when the illumination is continuous a "light chopper" or its equivalent is employed to produce impulses of a frequency that lends itself best to the purpose in hand.

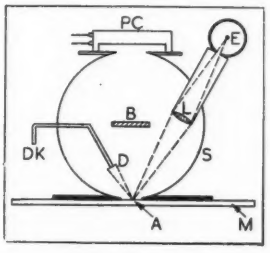


Fig. 1.—Diagrammatic representation of latest N.P.L. evaluator of surface finishes

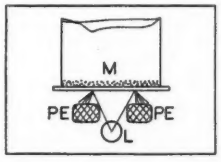


Fig. 2.—Illustrating the principle of the Lange reflection meter

So many industrial uses are being made of the photo-electric effect in the recording and measurement of excessively minute currents that any attempt at completeness would be out of the question, the examples here given being representative merely. Thus, for evaluation of surface finish, a new instrument developed by the National Physical Laboratory for such rolled materials as plastics and metals (fig. 1) measures the ratio of the light specularly reflected from a surface to the totally reflected light, a perfectly matt surface giving a figure of zero and a perfectly smooth surface a figure of 1.

Light from an enclosed lamp E is focused by the lens L upon the surface of the specimen, through an aperture A in the sphere of what is actually an integrating photometer. Part of the beam striking the surface at an angle is reflected at a similar angle and part is scattered. The photo-cell PC, built into the top of the sphere, measures first the current produced by the total illumination, specular and scattered, and secondly the scattered light only. When the total illumination is measured, a white disc D redistributes the reflected beam; when the diffuse light is measured, a turn of the lever DK substitutes a small dead black cell for the disc.

The photo-cell used is of the rectifier type, connected to a d'Arsonval galvanometer. Variation of a series resistance in the cell-galvanometer circuit adjusts the sensitivity for different types of material.

A small centrally placed disc B prevents any direct light from the specimen from acting on the photo-cell. A somewhat similar method was previously evolved by the British Non-ferrous Metals Research Association in collaboration with the G.E.C. Research Laboratories for the quantitative study of the effect of tarnish on the appearance of highly polished metals.

A special photometer was described in the December, 1939, issue of the *Transactions* of the American Illuminating Engineering Society for determining the percentage of light transmission through, or reflection from, plastic materials used as lamp reflectors, and the changes in diffusion brought about by pigmentation for the control of light flux by plastics which are available from crystal clear to opaque white. The photometer in question is divided into two compartments, each of which contains eleven photo-cells arranged to gauge the amount of light entering the compartment. An additional cell fixed to a moveable arm, which can be made to swing through an arc of 180 deg. is employed to determine the degree of diffusion of either the transmitted or the reflected light. It is possible by appropriate pigmentation to change the ratio of reflected and transmitted light without increasing the thickness of the reflector.

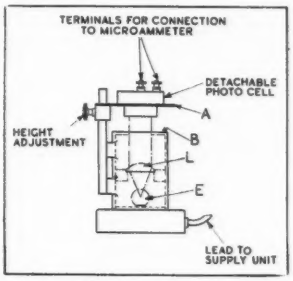
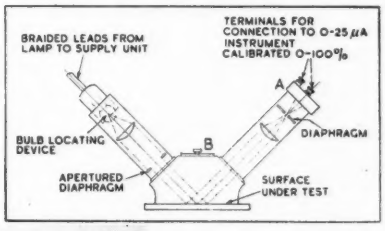
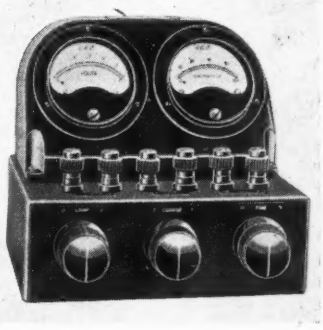


Fig. 3.—G.E.C. transparency comparator

A very useful advance in construction has been brought about by the annular type of photo-cell, circular rather like a life-buoy, through the open centre of which light can pass. This type has considerably simplified apparatus dealing with reflected light and has much reduced the dimensions of picture telegraph machines. In the Lange reflection meter (fig. 2) the rays from a lamp L pass through a ring cell PE on to the surface M being measured; the light reflected from the surface is thrown back upon the cell itself. When a powder is to be measured a flat-bottomed glass cell is used, the glass bottom of which is covered with the powder.





Figs. 4 & 5.—G.E.C. Salford comparative gloss meters

A very compact G.E.C. instrument for the comparison of similar materials (fig. 3) employs a flat selenium cell, which is detachably mounted above the specimen on an adjustable ring A, the specimen of transparent material being placed over the aperture B. Light from the lamp E is focused in the form of parallel rays by the lens L on the aperture. The voltage of the lamp is controlled by a coarse and a fine adjustment resistance. This instrument measures 7½ in. by 6¼ in. by 6 in. and weighs 5½ lb.

An important instrument designed for the comparison of the gloss of different samples of the same material, such as glazed paper,

cloth, ceramics, or paint (fig. 4), is manufactured by Salford Electrical Instruments, Ltd. This depends on the reflection from the surface of the sample at an angle of 45 deg. on to a selenium cell. Light specularly reflected from the surface under test falls upon a plain cell A, the rays being concentrated by a lens so as to pass first through a small diaphragm which prevents any effect on the cell due to diffuse reflection. If this cell is screened off, the diffuse reflection can be measured by placing the cell vertically above the specimen in the B position, the ratio of specular to diffuse readings then being a measure of the surface finish or gloss, or the extent of the tarnishing of metals after corrosion by exposure.

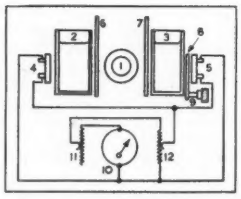


Fig. 6.—Salford colorimeter for direct comparison of liquid opacity

In two-dial instruments (fig. 5) one portion is for measuring the voltage of the bulb, controlled by a coarse and a fine adjustment rheostat in series with a 6-V accumulator, and the other is a micro-ammeter calibrated in terms of percentage light.

The Salford colorimeter for the direct comparison of the opacity of liquids (fig. 6) does this by means of two balanced photo-cells (4 and 5). The lamp bulb is represented by 1, the glass cells containing the liquids by 2 and 3; 6 and 7 are colour filters.

The Spekker photo-electric absorptiometer (fig. 7) is being widely applied for colorimetric analysis in metallurgical laboratories, for water analysis and in sugar testing, etc. Made by Adam Hilger, Ltd., it enables the concentration of solutions of metallic salts to be ascertained with great precision. Light from a 100-W projector lamp in the central vertical lamphouse passes through the specimen and thence to the indicating cell on the right hand side. The light also falls directly upon a compensating cell on the left hand extreme and, by means of an iris diaphragm associated with it, the two cells, which are connected in opposition, can be brought into balance.

When the glass cell containing the liquid to be measured is slid in front of the indicating photo-cell, the two cells are again brought into balance by means of a variable aperture controlled by the calibrated drum on the right of the lamp-house. One part of copper in 10 millions can be detected with "Carbamate" reagent; with iron estimated as thiocyanate it is possible to determine a concentration of 10^{-5} gramme per c.c. with a precision of about 1 per cent. Contrast filters of the colour complementary to that of the liquid under test are used in front of the liquid cells.

Fig. 7.—Hilger absorptiometer for colorimetric analysis

Kitchen Front Clubs

Edmundsons' Widespread Enterprise

THERE can be little doubt that without the willing and active work of the electricity and gas industries the National Food Campaign would have made only slow progress in its early months and to bring it and keep it at its present state of popularity would have been expensive to the country in both money and man-power. In September, 1939, all the electricity undertakers had to modify their propaganda arrangements. The Edmundsons group of companies was affected like others, but since it was felt that wartime conditions demanded the same degree of service to consumers as in peacetime it was decided that the companies' consumer-activities in electricity service centres, demonstrations and publicity, should be directed largely towards maintaining contact with consumers and helping them in the wise use of electricity and the electrical appliances they had purchased.

In support of these public relations activities, Press advertising was continued as "Home Management Corners" giving recipes and hints on cooking and other features of home management.

Kitchen Front Club poster and an advertisement for local press publicity

These "Home Management Corners" were not intended to advertise electrical appliances, and in many advertisements the only mention of electricity was the name of the local company. When the Ministry of Food asked for the co-operation of electricity undertakers it was a simple matter to devote these advertisements to the Ministry of Food's scheme. In fact, apart from the incorporation of the references to the National Food Campaign there was very little difference in the form of the advertisements.

The Edmundsons' advertisements appear in 109 local newspapers and according to the circulation figures given by these newspapers, over 6,000,000 copies were purchased in the first two months of the National Food Campaign. Furthermore, during the same period 500 demonstrations were given by the Edmundson companies to audiences in service centres, women's institutes and schools. The companies' officials acted in co-operation with the education and gas authorities, and in many cases initiated the formation of local committees.

This pioneer work in the campaign aroused local interest and before long joint demonstrations and food exhibitions were arranged in many of the larger towns. By the end of 1940 very close co-operation had been achieved with all education authorities and series of demonstrations were being given in many of the schools as well as in women's institutes.

Whatever the subject of propaganda, there is, however, usually a tendency for interest to flag unless a new stimulus is provided. Accordingly, the East Anglian Co. commenced a "Kitchen Front Club" in a few of its towns. The results of these first experiments were almost startling in their success, and when experience had been gained over two or three months, the Kitchen Front Club was adopted for the whole of the Edmundsons Group. Press advertisements were used in over 100 local papers in the fortnight ended March 29th. At the same time, a double crown poster was printed for use in service centres, on the companies' transport vehicles and other company sites, and membership cards were given to those joining the Club.

Conditions of Membership

The conditions of membership are very simple, viz :—(1) To support the war effort on the Home Front by helping the National Food Campaign ; (2) To assist fellow members by the exchange of cooking hints and recipes ; and (3) To keep up-to-date in food matters by reading the "Home Management Corner" and the Ministry of Food advertisements, listening to the "Kitchen Front" talks from the B.B.C. and attending the Club meetings.

Meetings of the Club (that is, the company's cooking demonstrations) are open to all, and although electrical appliances are used, the demonstrators devote their work to food matters rather than to electrical propaganda. At these meetings members are encouraged to raise queries and offer suggestions of general interest. Now that E.D.A. has arranged with the Ministry of Food that any electricity showroom may become a Food Advice Bureau, the Edmundsons Companies are arranging to increase their co-operation with the Ministry of Food's activities by scheduling as many as possible of their 150 electricity service centres and branch showrooms as advice bureaux.

Mobile Generating Sets

Their Scope in Connection with Electricity Supply Undertakings

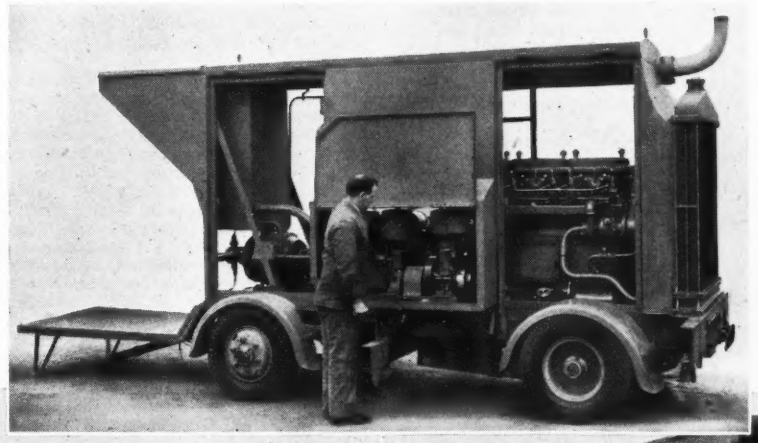
By W. A. Tookey, M.Inst.C.E., M.I.Mech.E.

Although they are now primarily useful in emergency, mobile "power stations" have a wide field in peacetime

WARTIME conditions have been mainly responsible for the development of Diesel-engine driven generating sets mounted on wheeled trailers to form a complete unit ready, at short notice, to be transported and set to work wherever enemy action renders it necessary. Some very considerable ingenuity has been exercised in designing these mobile power stations and their general utility has demonstrated that when normal times are once more with us there will be many services for which they will have special claims to be retained as permanent adjuncts to the equipment of the mains department of supply undertakings.

Mobile generating sets can be used not only in cases of emergency but also in outlying areas where the load has to be built up as a necessary preliminary to future mains extensions, or for supplying electricity to sites whilst large building contracts are in progress for factory or other development, until the installation of permanent plant.

The Clyde Valley Electrical Power Co. relies upon mobile emergency generating sets to provide electricity to areas cut off by breakage of exposed overhead lines due to snow or other causes during winter months, and to give continuous service over short or long periods until satisfactory and permanent repairs have been effected. The three photographs here reproduced clearly bring out the details of the general arrangement of one of the sets supplied to fill the need for a portable generating unit suitable for rapid road transport to remote Scottish villages which otherwise would be without electricity supply while cable repairs were in hand. The rated capacity of the outfit here illustrated is 80 kW (100 kVA at 0.8 power factor), three phase, four wire, 400 to 440 V.



Three views of the mobile generating set of the Clyde Valley Electrical Power Co.

The Bruce-Peebles semi-enclosed revolving-field alternator and exciter are direct-coupled to a six-cylinder Crossley-Ricardo 120-BHP, 1,500-RPM Diesel type engine. The trailer chassis or undercarriage was made by R. A. Dyson & Co., Ltd., in collaboration with Crossley Bros., Ltd. At the tow-bar end is the switchboard panel with a projecting canopy and a hinged platform which, when the set is in transit, gives adequate protection to the instruments and control gear. At the rear the radiator and water circulating pump are conveniently disposed. A small petrol-engine driven air compressor for starting purposes is fitted into a casing projecting from one of the side walls.

The chassis length is just under 12 ft. and the requirements for trailers under the Road Traffic Act are fully met. The cross members of the underbase are channels at the end of which hinged screw jacks have been provided which when lowered into position permit such adjustment as may be necessary to meet inequalities of the ground surface at the place where the set is to be operated. The whole equipment, as illustrated, loaded with fuel and water, weighs 5 tons 13 cwt. and forms a very compact and well protected arrangement when closed ready for transport.

Should extensive overhauls or replacements be required the hinged side walls give the necessary access but, in addition, the whole roof can be lifted off by means of the eyebolts provided so that the engine or other details can be readily removed for repair or replacement. Double pneumatic-tyred wheels with adequate brakes are fitted to the rear axle. The front axle is supported from a pivoted table to permit easy steering. All axle bearings are of the roller type.

Mobile generating sets for emergency use are constructed for much larger outputs than that already described. One of the largest probably is that designed for rail transport by the National Gas & Oil Engine Co., Ltd., consisting of an eight-cylinder 600-BHP Diesel type engine pressure-charged on the Buchi system, with direct-coupled alternator and exciter. The overall length of the unit is 54 ft. with bogie trucks at each end and the central portion of the undercarriage lowered so as to bring the overall height within the required dimensions.

Over one of the end bogies the platform supports the fuel and water tanks with radiator, fan and circulating pump and independent DC motor. Over the bogie at the other end a small engine drives a DC generator for lighting and energising the motor driven accessories and starting the air compressor. These are coupled by

clutches to an alternative drive from an AC motor supplied from the main generating set. High-voltage switchgear and transformer are also disposed on this platform. The whole arrangement is a complete power station and can readily be transported to any part of a railway system.

About midway between these two extremes is a 150-kW mobile generating unit mounted on a six-wheel trailer nearly 20 ft. long, the whole equipment weighing just under 18 tons. This has been developed for rapid transport from a central depot to any of several outlying stations in districts subject to enemy action, to provide an alternative to plant used for essential public services with special features to suit the conditions of operation.

Industrial Stand-by Plant

These examples will suffice to indicate how public utility companies are availing themselves of the peculiar advantages which modern internal combustion driven units provide. There is little doubt that their mobility and proved reliability will encourage their use as stand-by plant by proprietors of important industrial undertakings in which even a short cessation of power from public mains might involve great financial loss. The reliance upon continuity of supply from public mains has greatly increased during the past decade and in many large works there are furnaces, producer-gas generators and similar plants which if allowed to cool down would be damaged very considerably, while work in progress might also be spoiled.

Electric motors used in connection with the provision of air blast, water circulation and other subsidiary services must therefore be supplied with power within a short period subsequent to an interruption of the main supply. The cost of emergency mobile equipment might well be covered if only one such occurrence was satisfactorily mitigated by prompt action. Similarly, in case of fire damage, a mobile set, whether available at site or procurable from the supply undertaking, by being brought alongside remaining buildings could readily be connected up to existing motors so that at least that section of the factory could be maintained in a productive capacity. Obviously, the knowledge that such a unit could be utilised in emergency and was available upon application from the public supply authorities would influence very favourably the works proprietors who may still feel reluctant to take electricity from public mains because of the risk of failure of supply outside their own premises.

The Question of Cost

For emergency purposes, the cost of generation is not the most important consideration, but modern high-speed compression-ignition oil engines are not inefficient in this respect. With Diesel oil at 9d. per gal. and for outputs ranging between say two-thirds and full rated load, the fuel cost per kWh generated would be about 0.65d. and in a six-cylinder engine a gallon of lubricating oil would be used about every twenty working hours. Slower speed engines of larger capacity are naturally more economical in fuel consumption.

Great progress has been made in the design and construction of high-speed Diesel engines during recent years—a realisation of the extent of their development can be appreciated by the vast number of lorries, commercial and public service vehicles now fitted with this type of engine. The experiences of many operators have been exchanged and weaknesses thus brought to the notice of manufacturers have been eliminated to the mutual benefit of all concerned.

The ordinary driver is not usually a mechanic and therefore it may be said that any engine that will stand up to the normal rough handling of commercial vehicles in service will certainly be found reliable when under the care of an engineer, electrician or semi-skilled attendant such as would be put in charge of an emergency mobile unit of the type under consideration.

Modern Diesel engine units are not difficult to manage or to maintain in working order. Indeed since the supersession of air-blast injection by the high-pressure fuel pump (or mechanical injection) it has been called, on occasion, the " lazy man's engine," for it requires no more attention than is necessary to keep it reasonably clean and the periodical replenishment of fuel, lubricating oil and water. For this the makers of automobile engines are to be thanked because the details have been so improved in reliability that those engines that give trouble usually belong to the class of person who is always tinkering, adjusting this, that or the other detail—and who will not leave well alone.

The high-speed compression-ignition engine is simpler than the petrol or car engine, being devoid of carburettor and sparking plugs, and it runs much cooler under continuous loads because there is less heat to be absorbed due to the weaker mixtures used as compared with motor-spirit engines. The high piston pressures are certainly of somewhat longer duration during each cycle, but this is compensated for by strengthened cranks and larger bearing areas.

Speed Considerations

Every owner of a modern car realises that high rotative speeds are the order of the day, but accepts the fact without bothering to inquire what the actual speed of the engine may be when the accelerator pedal is pressed down on level unrestricted roads and the speedometer needle touches fifty or more miles per hour. Frequently, however, the same individual would boggle at the idea of an engine for an emergency mobile unit being run continuously at less than half the rotative speed of his own reliable motor car engine.

Peacetime racing and reliability trials have taught the motor-engine designer many things and wartime conditions have made it imperative that high-speed Diesel engines shall reliably develop every ounce of power that can be safely squeezed from them. In commercial designs the margin of safety is still on the conservative side and the horse-power ratings do not exceed the capabilities proved under such onerous conditions as when used as the propelling unit of sea-going fishing vessels—when the safety of the crew depends upon the freedom of the engine from what have been euphemistically termed " involuntary stoppages."

For mobile generating sets the advantages of high-speed engines are particularly suitable and special care is taken in the direction of lessening the noise of operation whether from the exhaust or reverberation from impulses against metallic surfaces. In time this will be still further improved and when that time arrives the purring note when running at yet higher speeds will be as much a matter of pride to the owner and attendant as is the sweet running of the engine in a Rolls-Royce car to-day.

NEW BOOKS

Electrical Engineering Laboratory Experiments. By C. W. Ricker and C. E. Tucker. Fourth edition. Pp. 458; illus. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 21s.

This laboratory manual first appeared in 1922. It has now reached its fourth edition. The new material deals with modern developments, such as vacuum and photo-electric tubes, and with modern and conventional tests on machinery.

The tests on gaseous and vacuum apparatus are preceded by a discussion on electrical breakdown. The determination of the characteristics of thermionic valves includes a circuit for automatic tracing. The remaining experiments on vacuum tubes treat of their use as audio-frequency amplifiers. Characteristics of photo-electric tubes occupy less than three pages. There is a useful chapter on the application of thyratron tubes for voltage and frequency control. Rectifiers are allotted three sections: the tungsten-argon, the glass-tube mercury-arc, and the steel-tank mercury-arc rectifiers.

In the new part on automobile generators, both the three-brush machine and the automatic-voltage regulator are included. Another of the new chapters on machines is one devoted to the polyphase shunt motor.

The work is well done, but most users will need expert guidance to carry out the experiments. These are well laid out, being preceded by a small amount of theory and followed by a description of the work to be done and by questions providing useful lines of thought. Such information, however, is seldom sufficient, and even if it were amplified it is neither possible nor desirable to dispense with the experienced teacher if full benefit is to be got from laboratory work.—S.P.S.

Power System Interconnection (Transmission Problems). By H. Rissik. Pp. 239; figs. 99. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, W.C.2. Price 25s.

The author is a well-known exponent of transmission line problems, and the book is based on articles contributed by him to the technical Press. System stability problems have not received a great deal of attention in this country as generating stations are in general located at the load centres and it is seldom necessary to transmit power over long distances. As the author hints at in his preface, however, circumstances do arise in which it is necessary to transmit large blocks of power over considerable distances on the national network so that British transmission engineers should have at least a working knowledge of stability problems.

In this connection the author's estimate of the power-carrying capacity of the 132-kV grid lines is conservative; although the nominal full load capacity of these lines has been stated to be 220 A or 50 MW, the conductor is suitable for currents up to 450 A, and in practice loads of 90 MW are commonly transmitted over a distance of 100 miles.

The book opens with a discussion on fundamental principles and power circle diagrams, and the author rightly stresses the utility and importance of the circle diagram in transmission line studies. Professor Woodruff's charts of the complex hyperbolic functions are reprinted in the book; these are invaluable for long line calculations. The author then discusses power limits, static and transient stability, and the last chapter deals with future possibilities in the sphere of long-distance transmission.

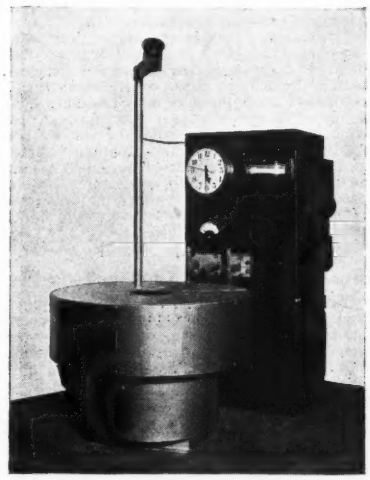
It is inevitable that any book on stability must draw largely on American sources, and a glance at the bibliography which is given at the end of the book shows to what extent the pioneer work has been carried out in the United States. The author has made the subject seem more homely by including a number of worked examples dealing with 132-kV lines operating at 50 cycles. It would, however, have been helpful if he had given more data on the characteristics of British machines. The diagrams are clearly drawn, and in spite of wartime difficulties the book is excellently produced.—J. S. F.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Electrode-type Salt Bath

FOR hardening steel tools without oxidation or decarburisation, so lengthening their useful lives, salt baths of the electrode type are offered by the GENERAL



Electrode-type salt bath furnace for tool hardening

ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. They are also advantageously used for treating tools and cutters that have brazed-on tips in place of batch-type furnaces which need an artificial atmosphere of inert gas.

The standard size of bath is rated at 30kW, being internally 8 in. in diameter and 12 in. deep, while the 70 kW size is 12 in. in diameter and 18 in. deep, their maximum operating temperature being 1,400 deg. C. The inner refractory lining is backed by heat insulating brickwork enclosed in a steel plate casing, suitable for standing directly on the shop floor. Auxiliary starting electrodes are provided, the main electrodes being mounted in the inner refractory lining and extended for connection by heavy copper bus-bars to a double-wound transformer, oil-immersed, three-phase, 440V, with a built-in (on load) tap-changing switch on the input side to provide the low secondary voltages required for the bath.

Fume extraction trunking leads to a fan driven by a 0.5-HP squirrel-cage motor fixed to a base frame on the floor alongside. A radiation type pyrometer is mounted on a pole attached to the furnace casing, the temperature indicator being on the control panel, together with a synchronous electric clock. Isolating switches are fitted for the clock and ammeter; tripole ironclad switches and fuses isolate the furnace and its fan motor.

Flexible Resistances

Flexible resistances of the design known as "Electrospot" were originally developed for relays in association with electrical contacts in automatic temperature controllers. The object was to improve their cooling capability without enlarging their size, since they had to be built into relays. Larger heat dissipating surface as well as volume were obtained simply by winding wire on a flexible heat resisting former in such a way that without further modification the resistor element so formed could be wound over the top layer of the relay coil.

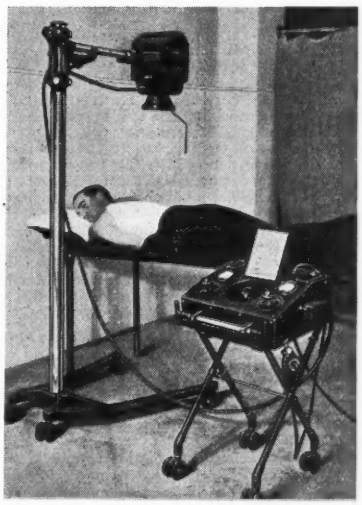
This is a typical example of one of the ways in which these products of ELECTRO METHODS, LTD., 112, Brent Street, London, N.W.4, may be incorporated in the manufacture of relays and instruments, electro-medical and radio equipment, or small switchgear, without having to provide space specially for the accommodation of resistors generally utilised for protective or heat dissipating purposes. They can be made up in any shape and conveniently attached to, or wound round, a coil, or rod, or other component part. They offer similar advantages in respect of such heavier plant as transformers, oil circuit-breakers and switchboards because of the simple ways in which they can be cheaply fixed, coupled with ability to withstand overloads for an appreciable time. A stock of standard lengths can be kept ready for cutting into any sizes desired, or easily wound into tubular form in conformity with particular specifications. Alternatively, these elements will serve as heaters, say, coiled round a test tube as a laboratory improvisation, or they might simplify the design of soil heating cable. When wound on asbestos 400 deg. C. is the safe temperature limit.

When particular constancy is essential the asbestos former is replaced by a glass string built up of strands and staples. Typical diameters of both varieties are one-eighth and one-sixteenth inch in lengths of 5 ft. A specially developed machine ensures evenly-spaced winding, even of wire as thin as 50 SWG. The pitch of the winder is adjustable and very close turns can be wound; the ohmic value per foot run is adjustable and an oxide layer on the wire preserves interturn insulation. The elements can be cut with a sharp knife or pair of scissors and for terminating fine gauge resistances of this kind special electrode soldering equipment is available for making the joint between cap and wire.

Portable X-ray Outfit

About a year ago a conveniently transportable X-ray outfit was announced by WATSON & SONS (ELECTRO-MEDICAL), LTD., 76, Castle Street, Reading, Berks. Though similar in some respects the newer MX-2 model now offered is more powerful, with provision for adjustment of voltage and current, while the output does not impose any limitation on continuity of use. Exposures of 12 seconds duration with 15 mA at 80 kV (peak) may be made in succession as rapidly as normal radiography permits, while the generous screening rating will be appreciated for such work as the control of fractures and localising foreign bodies. The whole outfit can be easily dismantled by one person and packed in four carrying cases for easy transport in a small car.

As an alternative to the demountable mobile stand a stationary stand with cassette tunnel is available and it is also practicable to fit the components to a suitable form of couch, as developed for field ambulances, thus making the equipment well suited to emergency work.

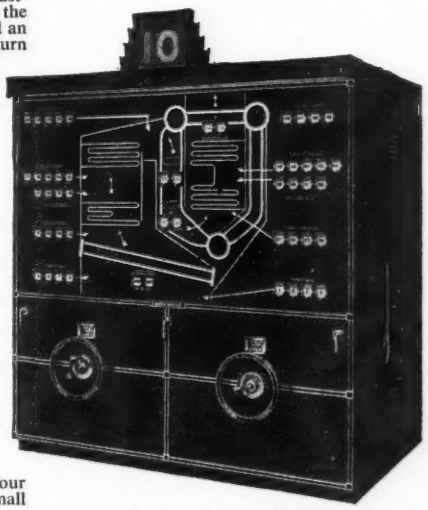


High power portable X-ray apparatus

Only the glass X-ray insert tube is made in America; the rest of the apparatus is produced in the Company's factory. The combination of the tube and transformer in a single oil-filled container, which is vacuum sealed, avoids high-voltage hazards and climatic instability. One of the most attractive features of the outfit is the practical convenience of its control panel, which can be mounted on a folding stand on wheels, or simply rested on a table or chair; a carrying handle is provided and a metal cover with quick-acting fasteners and rubber gasket to exclude dust.

Automatic Electrically-Controlled Soot Blowers

The system of automatic soot blowing developed by HOPKINSONS LTD., of Huddersfield, provides for the electrical operation of every blower in turn at the correct rate and for a predetermined length of time, so as to clean the boiler heating surfaces thoroughly without wasting steam. The whole sequence of operations is commenced with the pressing of a button by the attendant and the process then continues without further attention.



Electric control cubicle for soot blowers

An important feature is an arrangement whereby the idle time of any blower overlaps with the blowing time of another, so that very little time is lost during which no steam is being blown into the furnace.

The controls are centralised in a cubicle, suitable for fixing on the firing floor, and provided with a mimic boiler diagram on the front, together with the signal lamps for each blower. Any failure or irregular operation of a blower is brought to the attendant's notice by audible and visible alarms, and the faulty blower is also completely isolated so that maintenance work can be commenced while the rest of the system continues in operation.

When the "open" button is pressed, the master steam valve slowly opens, admitting steam to the piping system which is automatically drained by steam traps. Then follows an automatically-controlled period for warming the pipes, at the end of which the time-control relay switch starts the rotary sequence switch in the cubicle. Operation of the blowers can be arranged in any sequence and individual blowers can be made to operate a number of times if necessary. Provision is made for hand control in an emergency.

COMMERCIAL and INDUSTRIAL

Australian Cable Production. South American Markets

Supply Undertakings' Tax Dispute

LAST week the Court of Appeal (Lords Justices Scott, Clauson and Goddard) delivered a reserved judgment in a series of appeals and cross-appeals arising out of a decision by Mr. Justice Lawrence in dealing with cases in the Revenue Paper concerning the Reigate Corporation Electricity Department and the Woking Electric Supply Co.

The main point related to payments made to the two undertakings by the London and Home Counties Joint Electricity Authority. The Commissioners of Inland Revenue maintained that these were not trade receipts of a revenue nature for the purposes of taxation and Mr. Justice Lawrence upheld this view.

Against this decision the Crown appealed. It was argued that the undertakings were authorised suppliers of electricity and they had agreed that their generating stations would be kept ready for operation in case of need. Sums of money were paid for these services and the Crown contended that these sums should be treated as revenue and liable to taxation.

Delivering judgment, Lord Justice Clauson said that the Court was unable to accept the views of the Commissioners of Inland Revenue on the main issue; a business was being carried on and a profit was being made. Therefore the Crown was entitled to succeed and the judgment of Mr. Justice Lawrence would be reversed.

The Court directed that separate orders should be drawn as to the minor points and gave the Crown the costs in the Court of Appeal and in the Court below.

Later the two undertakings were given leave to appeal to the House of Lords.

Cable Manufacture in Australia

According to the *Industrial Australian and Mining Standard*, the works of Cable Makers Australia Pty., Ltd., at Liverpool, near Sydney, are approaching the production stage. Provided expected delivery from Great Britain of certain portions of the plant has not been delayed, operations should have commenced in June. As far as possible, machinery for the factory has been obtained in Australia, and it is expected that 300 operatives will be employed. Sales and distribution of the company's production will be in the hands of Australian houses of members of the Cable Makers' Association (Great Britain). Cable Makers (Aust.) Pty., Ltd., was incorporated in Victoria in August, 1940, as Cable Makers Aust., Ltd., and converted into a proprietary company on August 5th. The authorised capital is £500,000 in £1 shares. Its first issue of 300,000 shares was taken up by Metal Manufacturers, 142,500; members of the Cable Makers' Association (Great (Britain), 142,500; and British Insulated Cables, Ltd., 15,000. Directors of the company are Sir Alexander Stewart (chairman), Sir George Julius, Messrs. W. R. Caithness, J. W. Rutty and P. C. Holmes Hunt. Although the public is not directly interested financially in the new company, shareholders in the Australian group of base metal and associated companies have an indirect interest.

Electrician Awarded £1,250

In the King's Bench Division last week Mr. Justice Hilbery heard a claim by Mr. D. A. Dawson against Murex, Ltd., for damages in respect of personal injuries.

The plaintiff's case was that while he was employed as an electrician at the defendant company's Rainham (Essex) works a steel tray fell from an overhead crane fracturing his back and inflicting a scalp wound and concussion. As a result he was incapacitated and seriously disabled. He alleged negligence or breach of duty on the company's part.

This was denied by the company, which pleaded that if there had been negligence it was negligence in common employment with Mr. Dawson and therefore he could not recover damages. It was also stated that Mr. Dawson, through his wife, had elected to receive compensation under the Workmen's Compensation Act and in consequence he could not bring a civil action for damages.

His Lordship held that a breach of statutory duty had been established and plaintiff was entitled to succeed. The plaintiff had proved himself to be a man of ability, but although he was badly injured he was not invalided. He awarded the plaintiff £1,250 with costs.

Export Trade Pamphlet

Bruce Peebles & Co., Ltd., have sent us an advance copy of pamphlet No. 201, entitled "Outward Bound," which has been produced to encourage export business. Printed in three colours it covers, in twenty-four pages, the company's leading lines of manufactures, and deals in a concise manner with ranges of outputs, speeds, and voltages of various classes of rotating electrical plant and transformers, which are fully illustrated. It has been the company's aim to produce a pamphlet which the buyer of electrical plant will wish to retain as a book of reference. The pamphlet, which is being circulated overseas, should convey to business people abroad an impression of our confidence in the future.

Salvaged Lift Plant

Considerable interest has been aroused by our recent article on salvaging burnt apparatus. Since this was published on May 16th we have heard of a number of instances in which equipment damaged by blast has been almost miraculously restored to service. A typical instance is that of two lift motors and their control gear installed in a five-storey building, the top floor of which was completely destroyed. The apparatus was in a truly deplorable condition and apparently past all hope of repair. The owners' engineers, however, had different ideas, and by remarkable work on their part and on the part of the lift manufacturers, J. & E. Hall, Ltd., in the space of only two months, the equipment was repaired and re-installed in such good condition that only anyone who knew its history could now detect any signs of its ordeal. The cost, too, was only about one-third of that of replacing the apparatus by new.

Accessories for the Far East

A firm of exporters desires to receive catalogues from British manufacturers of electrical accessories, flex, etc., together with export prices, details of packing and other necessary particulars, to enable them to deal with an inquiry from the Far East. We shall be pleased to pass on any information from interested manufacturers.

Standard Insulators

Revision has brought into line the British and International Standard Specifications for insulators for overhead power lines. B.S. 137 now includes toughened glass insulators whereas the International Electro-technical Commission's document is still applicable to porcelain only. Performance tests are, in general, common to both varieties, but certain tests are peculiar to each type; for example, a porosity test is prescribed for porcelain but not for glass while a toughening test is prescribed for the latter but not for the former. The appendix on the selection of insulators has been entirely re-written and a new one added dealing with ball and socket fittings for suspension insulators, the dimensions of which have been standardised for interchangeability. Copies can be purchased from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. post free.

Facilitating Export Business

To assist exporters, particularly those with small consignments of goods, to overcome the restrictions and delays in despatch, and at the same time to ensure the speediest loading of ships, Beck & Pollitzer, Ltd., Universal House, Southwark Bridge, London, S.E.1, has formed an associated company under the style of Groupage, Ltd. At present the facilities offered concern shipments from only two ports, London and Liverpool, but other ports will be brought into the scheme as time goes on.

The idea of the scheme is the elimination of the small consignment as a unit for transport, with the grouping of shipments into loads at a receiving depot and delivering the load as a unit to the export steamer. Pre-entry at Liverpool Customs or application for shipping permits at that port are no longer necessary, Groupage, Ltd. being in a position to get this done in London. All the shipper is concerned with is the delivery of his consignment to the company's receiving depots in London—it is proposed to open depots in other parts of the country later—and the company will do the rest, arrange the pre-entry, shipping permits and transport (to whichever dock has a ship available). The form of consignment note prepared for the use of shippers reduces to a minimum the clerical work involved, a point which will be appreciated by firms with depleted staffs.

Brazilian Domestic Appliance Market

According to a report issued by the United States Department of Commerce, the chief kinds of electrical domestic appliances in demand in Brazil are flat-irons, vacuum cleaners, floor polishers and waxers, and paint sprayers. Although few families have such appliances as washing machines and dish washers, hotels, hospitals and laundries use them to some extent. Electric irons are manufactured by five firms in Brazil and retailed for about 6s. 6d. They are simple in construction and are likely to replace the 5,000 or more irons which were imported yearly from Germany before the war. The sale of vacuum cleaners is being helped by the construction of blocks of flats with little space for beating carpets. Floor polishers and waxers are popular because of the prevalence of parquet floors. In these lines a well-known Swedish firm leads, thanks largely to highly organised salesmanship on the instalment plan. Electric paint-spraying equipment is employed extensively in painting motor cars and lacquering furniture, and in railway and other workshops.

Electric Fans for Mexico

Since Mexico has been unable to obtain electric fans from Germany, Canadian firms have been inquiring into the possibility of replacing them, and the Canadian Trade Commissioner in Mexico City (Mr. A. B. Muddiman) has reported on the position. He finds that importers there are interested chiefly in a cheap non-oscillating type. Exhaust fans, window and floor fans, and wall-type fans are not in large demand. In order to compete successfully he says that a manufacturer must produce a full range of fans and ventilators. From estimates supplied to Mr. Muddiman by an engineer of many years' experience in selling electrical appliances it seems that the types of fans sold in Mexico, together with the percentage of total sales credited to each type, are as follows :—

	% of total sales
8-in. non-oscillating table fans (at a low price)	35
10-in. oscillating table fans	20
12-in. ditto	15
All sizes of exhaust fans (window and wall)	12
Ceiling fans of different types	10
10-in. non-oscillating table fans	5
Floor-type fans	2
12-in. non-oscillating table fans	1

Ventilating fans of the wall and window types are used only in the kitchens of restaurants and hotels, not in private apartments. The duty on electric fans and ventilators, each weighing up to 44 lb., works out at about 4d. per lb.

Argentine Electrical Imports

The Argentine Government has issued preliminary returns of the foreign trade of the Republic in 1940. They include the values of

the leading groups of electrical exports. These values are given below, together with a note of increases or decreases compared with 1939. It will be seen that the trade, except in incandescent lamps, has declined almost throughout. The rate of exchange for the Argentine dollar (peso) last year was between 15 and 17 to the £.

Through exchange regulations imports have been rigidly controlled for some time, but now import permits are no longer required for about three-quarters of Argentina's purchases from abroad. Facilities are being arranged for the import of increased quantities of United States manufactures at more favourable rates of exchange than have being in operation for some time.

	1940 $(000)	Inc. or dec. on 1939 $(000)
Parts for batteries and accumulators	1,380	+ 100
Batteries	138	— 230
Cells for batteries and accumulators	219	— 87
Radio-telephone apparatus	217	— 354
Radio receivers	2,524	— 442
Loud speakers	441	— 14
Parts for radio-telephones	2,524	— 416
Telephone apparatus and parts	1,026	— 335
Switches, circuit-breakers, &c.	787	— 157
Change-over switches	897	— 105
Incandescent lamps	1,544	+ 429
Current meters	2,225	— 671
Switchboards	88	+ 15
Insulating tubes	19	— 446
Other electrical material	4,666	— 14
Motors and dynamos over ¼ HP	1,809	— 460
Electric wires and cables and accessories	3,678	— 4,622
Flex	345	— 349

Luminescence

Wartime uses of luminescent materials are the subject of a bulletin (C.17) issued by the Research and Experiments Department of the Ministry of Home Security. The document is concerned only with excitation by ultra-violet and visible rays, the latter including daylight and artificial illumination; but it is not intended to recommend the use of luminescent materials in circumstances in which controlled light and suitably placed white surfaces can do all that is needed. The bulletin commences with definitions of the materials in question, drawing attention to relevant Standard Specifications, followed by outlines of the properties of materials available, both fluorescent and phosphorescent. Mention is made of such irradiation sources as black-bulb mercury vapour lamps, argon gas lamps, and tungsten filament lamps with black glass filters. Possible applications dealt with include signs and obstruction markings for A.R.P. purposes, instrument boards and emergency shelter requirements.

Resin-Paper Boards

The latest of a series of E.R.A. reports on the fundamental properties of dielectrics deals with the "Dielectric Properties of Experimental Resin-Paper Boards" (Ref. L/T100). In this Dr. L. Hartshorn, Messrs. E. Rushton (National Physical Laboratory) and N. J. L. Megson (Chemical Research Laboratory) describe experiments made on laminated boards prepared from the pure phenolic resins which have already been investigated (Refs. L/T80 and L/T81) and on a representative sample of paper. The experimentally prepared boards were found to have approximately the same values of permittivity and power factor as commercial boards of good quality, but certain samples of a special grade of commercial board were less affected by a moist atmosphere. Copies may be obtained from the British Electrical and Allied Industries Research Association, 15, Savoy Street, London, W.C.2, price 2s. 10d. post free.

Music Aids Production

It has long been established by specialists in industrial research that in factories where work is largely repetitive, musical interludes tend to relieve monotony and consequent fatigue.

The General Electric Co., Ltd., has been particularly active on installations of this character for industrial wartime purposes, a typical example being provided by a system recently completed in a large factory in the North. Radio signals are provided by a special panel-built three-waveband, five-valve superheterodyne; gramophone records are played on an automatic turntable unit, and both can be connected at will to amplifying equipment built in two parts, each with a power-handling capacity of 750 watts. The rack and panel principle of assembly is adopted for the three units. The radio and gramophone equipment, together with a pilot speaker, comprise one unit and the other two panels embody the amplifying equipment. Each of these amplifier panels employs seventeen valves, including four stages of push-pull amplification, each terminating in a power stage employing two "Osram" DA.250 valves also arranged in push-pull.

In addition to the radio and gramophone inputs previously mentioned, a microphone input is also provided on each panel so that announcements and air-raid signals and instructions, as well as music, can be broadcast throughout the works. In all, the system employs about 230 loudspeakers of the BCS.3178R industrial type.

Heat-treating Aluminium

The design, construction and operation of the several kinds of furnace made for annealing, re-heating, liquid salt-bath treatment and artificial ageing of aluminium alloys of all forms are surveyed in "AluminiumTechnique" (No. 14) issued by the Aluminium Union Limited. Among the variety illustrated is a batch-type oven with forced air circulation (Wild-Barfield Electric Furnaces, Ltd.), for ageing treatment, the work being contained in a 4 ft. cube basket that is removable from the furnace on wheels. Also with forced air circulation is a battery of 120 kW rating sunk into the shop floor to accommodate work baskets 6 ft. in diameter and 8 ft. 10 in. deep. A low-temperature (530 deg. C.) skip type with recirculated atmosphere is made by Metalectric Furnaces, Ltd., for heat treating alloy sections.

Among the electric furnaces made by the General Electric Co., Ltd., is one of 100 kW for billets with a rotary hearth operated by variable speed gearing. The charge is supported on a rigid hearth, annular in plan, 16 in. wide and of 5 ft. 9 in. mean diameter. The charging and withdrawal ports are close together and in one line of production. A twin vertical installation by the Electric Resistance Furnace Co., Ltd., has an electrically operated traversing bogie for supporting the quench tank, which may be brought under either furnace as needed; also a continuous pusher type for slabs which is fitted with a direct deflection Cambridge temperature regulator. A cylindrical batch type with charger, made by Birmingham Electric Furnaces, Ltd., is employed for annealing light-alloy tubes. Furnaces made by Gallenkamp & Co., Ltd., for testing the creep of metal at elevated temperatures are fitted with Cambridge potentiometric controllers with thread recorders.

Trade Announcements

Wild-Barfield Electric Furnaces, Ltd., announce that following the arrangement with Adam Hilger, Ltd., to be distributors of the Spekker Steeloscope manufactured by that company, this arrangement has now been extended in connection with the Spekker photo-electric absorptiometer (described in the article on "Photo-cells in Industry" elsewhere in this issue), of which Wild-Barfield Electric Furnaces have been appointed sole distributors in the United Kingdom to the engineering and metallurgical industries.

Brown Brothers, Ltd., re-opened their Hull Branch on July 14th at Parkfield Drive, Anlaby Road, Hull (telephone: 13853; telegrams: "Vindec, Hull.")

Change of Address

The Lawley Electric Storage Co., Ltd., has moved to Lawley Works, College Road, London, N.W.10 (telephone: Ladbroke 1284-5).

New Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced and illustrated leaflet (No. 28 BC9330) descriptive of the "Microgram" gramophone and speech amplifying reproducer for halls and factories.

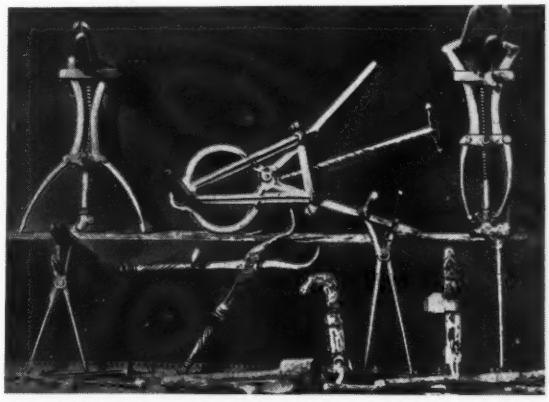
Frank Whitelegg, 90, Robin Hood Lane, Sutton, Surrey.—Leaflet (List SW) descriptive of a simple power-driven head for winding wire on to bobbins and formers.

Andamite, Ltd., 52, Ebury Street, Victoria, London, S.W.1.—Illustrated brochure and leaflets technically descriptive of ventilating and gas filtration plant for shelters and essential service buildings.

English Electric Co., Ltd., Stafford.—Publications Z10 and Z15 relating to heavy-duty electric cooking equipment for hotels, canteens, institutions, etc.

"Nothing New . . . ."

Hellerman Electric, Ltd., tells us that it has been discovered that the tool used for stretching its cable markers has a counterpart in the ancient Roman civilisation of over 2,000 years ago. The illustration reproduced here from M. Rene Fueloep's "Triumph over Pain" (Hamish Hamilton) shows surgical instruments recovered from the town of Pompeii, buried in an eruption of Mount Vesuvius in 79 B.C. The similarity between the top instruments and the Hellermann tool seems to establish the inevitability of some designs in relation to purpose since both are for stretching although the modern tool has a more pleasant application than the Roman one.



These ancient Roman surgical instruments show a remarkable similarity to cable binding tools

Instructors for A.T.C.

The A.T.C. needs qualified men to give instruction in the theory of electricity. Members of the electrical industry who can give a few hours a week are asked to get into touch with the Officer Commanding their local unit.

Annual Holidays

The works and offices of D. Gilson & Co., Ltd., Billet Works, Walthamstow, London, E.17, will be closed from July 19th to July 28th. A proportion of the office staff will be retained to deal with urgent correspondence.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

BEEANTEE ILLUMINATIONS—present address.

"COLDSPOT" refrigerators (Sears, Roebuck) —present address.

Power Engineers' Salaries

Revision from July 1st

THE National Joint Board of Employers and Members of Staff (Electricity Supply Industry) has issued a revised table of salaries for power station staffs to take effect from July 1st. The revision is in an upward direction, representing an increase of one point upon the existing rates.

The new salaries are shown in the accompanying table. The letters appearing in each class indicate (a) the salary for the first two years of service; (b) for the next two years; and (c) after four years' service.

Certain of the grades shown in the table bear definite descriptions :—Grade 1 is deputy chief official; Grade 3 is power station superintendent or mains superintendent (with charge of substations); Grade 8 is shift charge engineer; Grade 8b is substation charge engineer; and Grade 9a is switchboard attendant.

Employees in the London area are entitled to an additional 5 per cent. on the stated salaries, and in any district where conditions justify lower remuneration a reduction of 5 per cent. in the rates can be made by agreement.

SCHEDULE OF SALARIES

(Capacity or maximum in kW)

Grade		1	2	3	4	5	6	7	8	8a	8b	9	9a	10	10a	10b	10c	11	11a	11b
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Class A 1,000-2,000	a	509	444	400	346	327	298	270	270	250	232	—	—	—	—	—	—	—	—	—
	b	521	453	409	357	336	308	279	274	254	235	—	—	—	—	—	—	—	—	—
	c	533	464	419	369	344	318	288	279	258	238	—	—	—	—	—	—	—	—	—
Class B 2,001-4,000	a	545	474	428	381	352	329	298	284	262	242	—	—	—	—	—	—	—	—	—
	b	561	489	442	389	363	336	308	289	266	245	—	—	—	—	—	—	—	—	—
	c	578	503	456	398	374	344	318	293	270	248	—	—	—	—	—	—	—	—	—
Class C 4,001-6,000	a	595	518	470	405	385	350	329	298	274	253	232	—	—	—	—	—	—	—	—
	b	605	528	478	417	392	360	335	306	282	259	237	—	—	—	—	—	—	—	—
	c	615	537	487	430	399	371	340	315	290	266	243	—	—	—	—	—	—	—	—
Class D 6,000-8,000	a	626	546	495	442	406	381	346	324	298	272	248	232	—	—	—	—	—	—	—
	b	641	561	508	453	417	387	354	329	303	278	255	237	—	—	—	—	—	—	—
	c	655	575	521	464	427	394	364	335	309	285	261	244	—	—	—	—	—	—	—
Class E 8,001-13,000	a	—	590	535	476	438	399	373	340	315	291	268	249	232	—	—	—	—	—	—
	b	—	604	542	483	448	409	382	349	323	299	274	253	234	—	—	—	—	—	—
	c	—	619	548	489	460	420	392	357	332	306	282	256	236	—	—	—	—	—	—
Class F 13,001-25,000	a	—	—	555	496	471	430	400	366	340	314	289	259	238	—	—	—	—	—	—
	b	—	—	568	512	477	440	405	374	348	321	296	265	240	—	—	—	—	—	—
	c	—	—	582	529	484	448	410	382	354	328	301	270	242	—	—	—	—	—	—
Class G 25,001-50,000	a	—	—	595	546	490	458	415	390	362	335	308	275	245	232	—	—	—	—	—
	b	—	—	609	557	505	468	429	395	367	341	315	282	250	237	—	—	—	—	—
	c	—	—	624	569	520	478	443	399	373	348	322	288	256	243	—	—	—	—	—
Class H 50,001-100,000	a	—	—	639	581	536	488	456	403	378	353	329	295	261	248	232	—	—	—	—
	b	—	—	659	595	546	502	464	415	389	362	336	302	269	255	237	—	—	—	—
	c	—	—	680	611	556	517	473	428	399	371	344	309	277	260	243	—	—	—	—
Class J 100,001-150,000	a	—	—	699	626	566	532	481	440	409	380	350	317	285	267	248	232	—	—	—
	b	—	—	717	642	581	546	494	451	420	390	359	326	293	273	255	237	—	—	—
	c	—	—	735	658	595	559	505	462	431	399	369	334	300	281	261	244	—	—	—
Class K 150,001-200,000	a	—	—	753	674	610	573	518	474	442	409	378	343	307	288	267	249	232	—	—
	b	—	—	773	692	626	588	532	487	453	420	388	351	315	296	273	256	237	—	—
	c	—	—	791	708	642	602	545	498	464	531	398	360	324	303	281	262	244	—	—
Class L 200,001-250,000	a	—	—	811	726	657	617	558	511	476	442	407	370	332	310	288	268	249	232	—
	b	—	—	832	744	674	633	573	524	489	453	418	380	341	318	296	274	256	237	—
	c	—	—	852	763	691	648	587	538	500	464	429	390	350	327	303	282	262	244	—
Class M Over 250,000		—	—	873	782	708	665	601	550	513	476	440	399	358	335	310	289	268	249	232

Diesel Working Costs

THE report on heavy-oil engine working costs compiled annually by the Diesel Engine Users' Association is to be presented for discussion in London on July 30th. It is generally similar in scope and form to recent predecessors, though enemy action has delayed its publication this year.

During the year 1939–40 some 40.5 million kWh was generated by 37 stations at home (and 98.5 million kWh by 25 stations overseas) which contained 174 (127) engines totalling 534,476 kW (47,250 kW) while the maximum loads reached 37,888 kW (18,846 kW) which represented 78.2 (51) per cent. of the total plant installed. Of the whole 62 stations concerned, the fuel consumption was well below the standard reference curve in 37 cases; the average has continued to fall to 0.618 lb. per kWh produced, while the average running plant load factor has increased to 64 per cent. Regarding consumption of lubricating oil, 26 stations operated more than the arbitrary standard of 2,380 rated BHP hours run per gallon; about half that number actually used less than half the amount of oil represented by that figure.

The cost of fuel oil at home was 117s. 2d. per ton, including tax and delivery; overseas it was 93s. 9½d. per ton. Lubricating oil cost 2s. 7½d. at home and 3s. 2¾d. overseas. The total engine cost ranged from 0.446d. to 2.12d. per kWh produced at home and from 0.365d. to 1.484d. per kWh overseas.

All tables have been brought up to date, with two exceptions. The reasons are that particulars needed for the revision of liner wear data are not at present available; also last year's figures represented with reasonable accuracy the pre-war costs of renewals and replacements, whereas the inclusion of figures from this year's returns would have produced averages that could not have been representative of either the pre-war position or present circumstances.

The report includes records of water-works plant and for the first time of an engine which was changed over from oil to producer gas. Thus the total number of stations recorded is 76, compared with 74 in the previous year, which is satisfactory considering prevailing war conditions. Data from certain undertakings listed in the long-term records have not been brought forward in recent years, the reason being that those stations are using their Diesel plant almost exclusively for peak load relief in connection with grid supplies of electricity, or for emergency duty, which has had the effect of reducing their outputs and increasing the cost per kWh generated by them. Consequently, while the continued operation of such plant has been of economic advantage, the inclusion of records of their performances would spoil long-period averages for purposes of comparison.

It is also worth bearing in mind that running costs may be affected quite materially by the method of costing chosen for their calculation. For instance some concerns may consider that all increased prices of labour and materials should be charged immediately without taking stock prices into account, which is not the practice of all undertakings, especially in so far as concerns fuel oil and stores which are often considerable.

ELECTRICITY SUPPLY

Vehicle Inquiry at Cardiff. Transport Association Meeting

Blackburn.—WORKS SUPPLY.—The Corporation Electricity Committee is to supply electricity to a works, and a sum of £327 is to be spent on modifications to the works transformer panels.

Cardiff.—SUPPLY TO PENARTH.—A deputation from the Penarth Urban District Council has been assured by the Corporation Electricity Committee that it will make every effort to obtain as quickly as possible a Special Order permitting it to extend the supply to Penarth.

ELECTRIC VEHICLES.—The Electricity Committee has asked the electrical engineer to report regarding vehicles needing replacement and has decided that where possible a transfer be made from petrol to electric vehicles.

Cheltenham.—FRINGE ORDER.—The Corporation Electricity Committee is seeking a Fringe Order to supply premises in the parish of Staverton.

Darwen.—INCREASE IN CHARGES.—The Town Council has made the following increases in electricity charges from the June quarter readings as follows :—Prepayment lighting meters, ½d. per kWh ; supplies not subject to coal clause, 7½ per cent. A minimum consumption charge, 2s. 6d. per meter per quarter, has also been introduced. Councillor Clark, vice-chairman of the Department, states that the Corporation would face a deficiency of over £4,000 at the end of the year if the charges were not advanced.

Eccles.—SHELTER INSTALLATIONS.—The Corporation Electricity Committee is to install electric lighting in 200 communal shelters and is preparing a scheme for electric heating. For a combined lighting and heating supply a special all-in rate of 1d. per kWh will be charged, plus a rental of 2s. 6d. per quarter for each necessary time switch. The time switches will be taken from public lighting lamps which are not in use during the war, and the revenue received by way of rental will be credited to the public lighting account.

INDUSTRIAL INSTALLATIONS.—Messrs Mitchell, Shackleton & Co., Ltd., are to reorganise the electrical equipment at the Vulcan Works, and Sir W. H. Bailey & Co., Ltd., are to complete the electrification of the Ellesmere Foundry.

LINK WITH SALFORD.—A revised scheme costing £250 for linking up with the Salford undertaking has been approved by the Electricity Committee.

Kettering.—SCHOOL SHELTER HEATING.—The Corporation Electricity Committee has submitted an estimate amounting to £13,000 for the heating of all the school shelters by electricity.

Newark.—SUBSTATIONS AND EQUIPMENT.—Sanction has been received by the Electricity Committee to a loan of £1,480 for the provision of a substation. The purchase of switchgear costing £220 for providing an additional supply to a factory has also been approved as well as the use of £200 from the Electricity Department's net surplus for the purchase of a 300-kVA transformer for a substation.

Rushden.—SHELTER LIGHTING.—Public air raid shelters are to be lighted by electricity from the town supply (Rushden and District Electric Supply Co.).

Stoke-on-Trent.—ORDER APPROVED.—The application by the North West Midlands J.E.A. for a Special Order, which was the subject of an inquiry at Stoke in May, has been approved by the Electricity Commissioners.

Surbiton.—SUPPLY FOR WARDENS' POSTS.—The Borough Council has decided to supply electricity to wardens' posts at a cost of £1,400 a year.

Overseas

Argentina.—INCREASING ELECTRIC POWER OUTPUT.—According to the *Revista Electrotecnica*, the official organ of the Argentine Association of Electrical Engineers, the sales of electrical energy in the Argentine Republic during last year are estimated to have amounted to 1,941 million kWh, as compared with 1,877 million kWh in 1939, an advance of 3.7 per cent. The figures are those compiled by the Argentine Association of Electric Power Producers and Distributors and are stated to represent approximately 95 per cent. of the aggregate amount of electric power sold in the country.

ELECTRICAL CO-OPERATIVES.—The Argentine Government has set up a committee to inquire into the establishment of electric "co-operatives." The committee will be presided over by Sr. Spota, head of the Electrical Service of the Ministry of Public Works. Meanwhile the first co-operative generating plant has already been inaugurated. Although only small it is an interesting experiment. A monopoly has been granted the co-operative for twenty years. If the committee is satisfied that the system will generally benefit the country existing producers will be combined into co-operatives and the present system will be abandoned.

Australia.—PYRMONT POWER STATION EXTENSIONS.—The *Industrial Australian and Mining Standard* reports that the State Electricity Advisory Committee in New South Wales has approved of the reconstruction and enlargement of the Pyrmont power station by the Sydney County Council as soon as the preliminary work can be done and contracts let. This is the first section of a £10,000,000 plan of electrical development for the metropolitan area of Sydney. The immediate work proposed will cost from £4,000,000 to £4,700,000.

The scheme provides for steady development of electricity generation undertakings in the metropolitan area in the next ten years. The County Council will spend about £6,500,000 for new generating plant; the Railway Department about £2,000,000; the Electric Light and Power Supply Corporation, Ltd., about £1,200,000 for the Balmain power station; and the Public Works Department and local government bodies about £970,000.

Mr. Vine-Hall, general manager, reported to the County Council that the Council's engineering staff was pressing on as rapidly as possible with the preliminary work for the reconstruction of the Pyrmont power station, so that it would be ready for the plant to be installed in it. The Railway Commissioners had agreed to construct a special siding to facilitate the delivery of coal to, and the removal of ashes from the new power station.

A contract has been placed for an additional generating unit at Bunnerong to cost about £1,000,000.

Canada.—MONTREAL LIGHTING SYSTEM TO BE MODERNISED.—As a condition for a reduction of at least £300,000 in the rate paid by the city of Montreal to the Montreal Light, Heat & Power Consolidated for the years 1941, 1942 and 1943, the city is to modernise its lighting system before the end of 1943.

New Zealand.—REDUCTIONS IN WELLINGTON.—It is reported that the surplus on the year's working of the Wellington municipal electricity undertaking is expected to be not less than £40,000 in spite of adverse circumstances. Consumers are to benefit from this by concessions in charges estimated to cost £27,500, which were to come into force on July 1st.

AUCKLAND.—The attainment of £1,000,000 annual revenue by the Auckland Electric Power Board was recently celebrated by a special function at which a cheque for £3,000 was handed over to the Fighting Forces Fund. The Board has now been in existence for nineteen years. The *New Zealand Electrical Journal* says that during the function tributes were paid to the late Mr. Alexander Wylie, the first electrical engineer to the Council, who laid the foundations of the present system, and to the Rt. Hon. J. G. Coates, the author of the legislation by which supply authorities were allowed the fullest measure of local control which had amply justified itself.

Public Transport Association

THE annual meeting of the Public Service Transport Association was held in London on July 9th under the chairmanship of Sir Joseph Nall, D.S.O., T.D., M.P., vice-president and chairman of the Council.

In the course of his speech the chairman referred to a number of matters arising out of the war, including the movement of the civil population, the hire of vehicles to the Government and other authorities for various purposes, vehicle lighting restrictions and materials control. Sir Joseph said :—" Whatever difficulties and new problems the future may have in store for us, I am quite sure that the members of this association, no less than our contemporaries throughout the industry, will do all in their power to maintain the vital public service of passenger transportation."

TRANSPORT

Argentina.—NEW ELECTRIC RAILWAY SUBSTATIONS.—The Argentine Eastern Railway Co. has recently established three new substations in connection with the electrified sections of its system, two of the stations having a capacity of 1,800 kW and one 1,200 kW. The *Revista Electrotecnica* reports that at the same time, the frequency of the power used has been changed from 25 to 50 cycles and that the contract for the whole of the new transformer and mercury rectifier equipment was placed with the General Electric Co., Ltd.

Bournemouth.—LOSS ON TRANSPORT UNDERTAKING.—The Corporation Transport Committee reports a deficit of £1,562 on the transport undertaking for last year.

Hull.—TROLLEY BUS SCHEME.—The Corporation Transport Committee is to consider a recommendation by the general manager that the Anlaby route should be converted to trolley bus operation.

South Shields.—INCREASED TROLLEY BUS FARES.—Certain fares on the trolley bus services have been increased by a halfpenny, and it is proposed to discontinue the issue of 2½d. and 3½d. double journey tickets.

PROPOSED TROLLEY BUS EXTENSION.—The Town Council is applying to the Ministry of Transport for permission to carry out immediately an extension of the trolley bus system from Laygate Circus to the docks at a cost of £2,500.

RADIO AND TELEPHONY

Hull.—RADIO RELAY CHARGES.—As an increase on the service rental has been put into operation by the Broadcast Relay Service without the Corporation's written approval having first been obtained, the Telephones Committee has instructed the Town Clerk to apply for an injunction against the company.

Norway.—TELEPHONIC COMMUNICATION DEVELOPMENTS.—According to the *Postnachrichtenblatt*, new telephone circuits have recently been established in Norway between Oslo and Bergen, the lines passing through Odda and Stavanger. The authorities have also recently started work on the establishment of a high-frequency telephone line between Oslo and Bergen, along which it will be possible to transmit several conversations at the same time.

Stoke-on-Trent.—RADIO RELAY SERVICE.—The Corporation Emergency Committee has accepted a tender of the Northampton Wireless Relay, Ltd., for the provision of a wireless relay service for the city. The company is to pay the Corporation 10 per cent. of the service rentals received, with a minimum payment of £200 per annum.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

23033. "Electrically heated electrode steam boilers provided with power consumption and salt concentration controllers." N. Hallman. August 9th, 1939. (537419.)

24918. "Lamps for vehicles." F. R. Dietrich. November 8th, 1938. (537321.)

30479. "Dielectric for insulating couplings." J. H. McGuire. November 21st, 1939. (537425.)

31192. "Synchronising signal generators." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1938. (537375.)

32153. "Electric cells and batteries." Varley Dry Accumulators, Ltd., and J. A. Szper. December 13th, 1939. (537377.)

32231. "Electric lamp masks." J. Lucas, Ltd., and H. V. Simco. December 14th, 1939. (537296.)

32251. "Measurement of gas flow to gas mixing appliances." F. W. Haywood and Wild Barfield Electric Furnaces, Ltd. December 14th, 1939. (537298.)

32303. "Electric modulation systems particularly for television." Standard Telephones & Cables, Ltd. December 17th, 1938. (537378.)

32304. "Arrangements for suppressing parallel oscillation in push-pull amplifiers and oscillators." Standard Telephones & Cables, Ltd., F. R. Hill and G. G. Samson. December 15th, 1939. (537300.)

32315. "Elastic fluid operated alarms for making periodical signs." Kockums Mekaniska Verkstads Aktiebolag. December 30th, 1938. (537301.)

32341. "Alternating current electric circuit breakers." A. Reyrolle & Co., Ltd., A. Allen and J. Christie. December 15th, 1939. (Cognate application, 571/41.) (537302.)

32360. "Variable coupling transformer, more particularly for wireless receivers." Fabbrica Italiana Magneti Marelli. December 29th, 1938. (537303.)

32485. "Electric circuit breakers." A. Reyrolle & Co., Ltd., and A. T. Robertson. December 19th, 1939. (537410.)

32497. "Electric cable distributing panels." Standard Telephones & Cables, Ltd., and J. A. Leno. December 19th, 1939. (537412.)

32498. "Electromagnetic indicator devices." Standard Telephones & Cables, Ltd., E. R. Myatt and S. F. Gold. December 19th, 1939. (537413.)

32556. "Manufacture and production of electrical resistance heating elements." J. C. Chaston. December 20th, 1939. (537427.)

33124. "Self starting synchronous electric motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. December 30th, 1939. (537432.)

33125. "Alternating current synchronous motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. December 30th, 1939. (537433.)

33126. "Alternating current synchronous motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. December 30th, 1939. (537434.)

1940

359. "Electrical combined switch-fuse and isolator devices." G. E. Whitehead and Whitehead Switchgear & Inventions, Ltd. January 6th, 1940. (537345.)

400. "Reproduction of recorded sound." Scophony, Ltd., and A. J. Gale. January 8th, 1940. (537437.)

733. "Electromagnetic apparatus such as electromagnetically operated relays, contactors and switches." Westinghouse Electric International Co. January 12th, 1939. (537346.)

751. "Fluid operated motors." R. Brooks, W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd. January 12th, 1940. (537438.)

903. "Band-pass filter for electrical communication systems." S. P. Chakravarti. January 15th, 1940. (537439.)

1708. "Electric push switches." Midland Electric Manufacturing Co., Ltd., and A. W. Vicary. January 27th, 1940. (537348.)

1877. "Slow motion driving mechanism suitable for driving adjustable members in radio receivers, and for like purposes." Marconi's Wireless Telegraph Co., Ltd., and W. J. Davis. January 30th, 1940. (537349.)

2420. "Electric oscillation generators." British Thomson-Houston Co., Ltd., and D. J. Mynall. February 8th, 1940. (537310.)

2533. "Systems sensitive to the direction of propagation of electromagnetic waves." Standard Telephones & Cables, Ltd. March 7th, 1939. (537389.)

3110. "Electric circuit breakers of the air-break type." English Electric Co., Ltd., A. R. Blandford and F. G. Rowland. February 19th, 1940. (537311.)

3449. "Multi-position electric switches." British Thomson-Houston Co., Ltd., and W. L. Wise. February 23rd, 1940. (537315.)

3676. "Electrical ignition apparatus." British Thomson-Houston Co., Ltd., and D. F. Welch. February 28th, 1940. (537317.)

3711. "Wireless receiving systems." Marconi's Wireless Telegraph Co., Ltd. February 28th, 1939. (537350.)

3986. "Electrically heated clothing and equipment." E. H. Taylor. March 4th, 1940. (537351.)

4237. "Television transmitters." Loewe Radio Co., Ltd. March 9th, 1939. (537352.)

4579. "Electric lamps for use with rafts, life jackets, buoys and other buoyant marine life-saving apparatus." A. H. Double. March 12th, 1940. (537353.)

4699. "Electric timing switches." Edison Swan Electric Co., Ltd., and E. W. Norman. March 13th, 1940. (537354.)

4936. "Inspection or hand lamps." A. Bellow. March 16th, 1940. (537323.)

4957. "Electric motors and generators." Delco-Remy & Hyatt, Ltd., and S. H. Blazey. March 18th, 1940. (537392.)

5067. "Circuit arrangements for operating electric discharge lamps." British Thomson-Houston Co., Ltd., W. J. Scott and L. J. Davies. March 19th, 1940. (537447.)

5603. "Absorption refrigerating apparatus." Electrolux, Ltd. May 30th, 1939. (537327.)

5635. "Electromagnetic relays." Marconi's Wireless Telegraph Co., Ltd., and A. J. Campbell. March 28th, 1940. (537450.)

6444. "Contacts for electric circuit breakers." G. Ellison, Ltd., and W. W. Prudhoe. April 10th, 1940. (537356.)

6459. "Two part electric couplings." British Thomson-Houston Co., Ltd., L. Hubble and E. R. Edinborough. April 10th, 1940. (537357.)

6628. "Turbine blading." Westinghouse Electric International Co. April 15th, 1939. (537455.)

6859. "Electric transformers." British Thomson-Houston Co., Ltd., and G. N. Leech. April 16th, 1940. (537456.)

8951. "Mercury boiler feed apparatus." British Thomson-Houston Co., Ltd. May 20th, 1939. (537361.)

9197. "Clothes wringers." British Thomson-Houston Co., Ltd. May 24th, 1939. (537362.)

9278. "Frequency compensation in automatic voltage regulators." British Thomson-Houston Co., Ltd. May 27th, 1939. (537363.)

10750. "Electric circuit breakers of the liquid blast type." British Thomson-Houston Co., Ltd. June 22nd, 1939. (537364.)

10755. "Electric resistance welding machines." British Thomson-Houston Co., Ltd. June 23rd, 1939. (537365.)

Food Advice Bureaux

E.D.A.'s Part in National Campaign

FOR a long time E.D.A. has rendered assistance to the Ministry of Food, a notable contribution in the early days taking the form of the Association's food demonstration charts, of which 55,000 were circulated, and folders and booklets designed on similar lines of which many hundreds of thousands were distributed.

More recently the Association has sought means of rendering more personal help, and with the approval of the Public Relations Department of the Ministry of Food an effort has now been made to establish food advice bureaux in showrooms where suitable accommodation and staff facilities exist. The initial response to E.D.A.'s appeal has been beyond all expectations, and nearly 200 bureaux have already been set up.

The Association is providing undertakings with attractive window pelmets bearing the words "Food Advice Bureau in support of the National Food Campaign." Obviously it is not permitted to use the name of the Ministry of Food in the title since the bureaux are not controlled by the Ministry.

With the help and co-operation of the Ministry of Food the Association has already circulated a considerable amount of information for the guidance of staff and demonstrators in charge of food advice bureaux; up-to-date information will continue to be issued weekly until further notice. Close contact with the Official Ministry of Food advice centres is urged by the Association, which has just issued to all undertakings an up-to-date list of these centres. The Association points out that the staffing of a bureau is of the greatest importance and that it is far better for it to be open only two or three days a week, or at stated hours during the day, than to risk leaving it at any time in charge of anyone not having the right experience.

Other details which have been submitted to all electricity supply undertakings in connection with the food campaign include food talk gramophone records; demonstration notes and recipes; press advertisements; bureau layouts and the provision of well known Ministry of Food lecturers. The Ministry has also issued details of an information board which has been adopted by 350 undertakings; in due course E.D.A. will, on behalf of the Ministry, reissue notices, news items, &c.

It cannot be too strongly urged that while making a useful contribution to an important national effort, electricity supply undertakings are, by means of the food advice bureau, afforded a simple and effective means of keeping contact with consumers and maintaining their goodwill, which is consistent with the perfectly legitimate object of preserving public service through these difficult times. It is, of course, too early to assess the value of the bureaux, but many undertakings have stated that they are finding the work well worth while; the greatest number of weekly inquiries at a single bureau to date is 520.

The Association will be glad to hear from any undertakings that have not yet considered the proposal and will render every possible assistance in the establishment of bureaux where conditions are suitable.

Silver Solder

THE revision of B.S. 206, silver solder, grades A, B and C, includes a further type of solder of the quaternary alloy class (*i.e.*, containing silver, copper, zinc and cadmium) which is now being increasingly used in industry. An appendix has been included for general information, which gives the melting range of the three grades of solder that are now covered by this specification, copies of which will shortly be obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d.

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities.

Reports and Dividends

Callender's Cable & Construction Co., Ltd., held its annual meeting on July 11th at which Sir J. Fortescue Flannery, Bt. (chairman), presided. As was previously announced, the meeting was confined to formal resolutions, but the chairman took the opportunity to express the regret of the company at the recent death of Mr. T. O. Callender, who was for many years responsible for the sales direction of the marine department. Tribute was paid to the company's employees for their courage and loyalty.

Veritys, Ltd., report a profit for 1940 of £49,048, as compared with £21,473 for the previous year. After providing for income tax, war expenditure, etc., it is proposed to pay a dividend of 7½ per cent. (against 6 per cent.), to place £10,000 to reserve and to carry forward £4,324 (against £5,890 brought in).

The Para Electric Railways & Lighting Co., Ltd., reports gross receipts for the year of £120,939, as compared with £108,510 in the previous year. From this are deducted expenses, renewals and amortisation, leaving a debit of £27,662 (against £15,610). After adding interest, profit on sale of investments, &c., and deducting London expenses, income tax, debenture interest, sinking fund, &c., the adverse balance for the year is £42,787, which with the debit brought in makes a total debit of £200,197 to be carried forward.

W. & T. Avery, Ltd., report a net profit of £130,661 for the year to March 31st last, after providing for tax, as compared with £151,098 for 1939–40. It is proposed to pay a dividend on the ordinary shares of 15 per cent. (same). A sum of £10,000 (£30,000) is placed to general reserve and £45,000 (£25,000) to war contingency reserve; no allocation is made to the pension fund (against £10,000). The amount carried forward is £63,751 against £65,207 brought in.

The Electrical Finance and Securities Co., Ltd., reports a revenue for 1940 of £100,399, as compared with £101,188 for 1939. After deducting debenture interest, sinking funds, income tax, general expenses, etc., it is proposed to pay a final dividend of 6 per cent., plus a bonus of 2½ per cent., making 12½ per cent. for the year (same), and to carry forward £46,929 (against £45,692 brought in).

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a profit for 1940 of £38,469, as compared with £31,216 for 1939. After providing for U.K. taxation (£7,818) and placing £16,000 to depreciation reserve, there is a balance of £14,650. The ordinary dividend for the year is maintained at 7½ per cent., and £11,163 is carried forward (against £10,576 brought in).

George Kent, Ltd., have announced a final dividend of 7 per cent., plus a bonus of 2½ per cent., making 12½ per cent. for the year (against 9 per cent.).

The Traction and General Investment Trust, Ltd., has declared an interim dividend of 3 per cent. (against 4 per cent.).

Crossley Brothers, Ltd., are maintaining the deferred ordinary dividend at 5 per cent.

The Electrolytic Zinc Co. of Australasia has announced a final dividend of 8 per cent., making 14 per cent. for the year (unchanged).

British Timken, Ltd., report a profit for 1940 of £114,400. The dividend remains unchanged at 15 per cent.

Meters, Ltd., reports a net profit for the year ended March 31st of £12,990, as compared with £19,567 for 1939–40. The final ordinary dividend is 6½ per cent., again making 9 per cent. for the year, taxation reserve receives £550, and £13,210 is carried forward (against £13,841 brought in).

The British Thermostat Co., Ltd., reports a net profit for the past year, after tax, of £34,595, as compared with £25,616 for the preceding year. The final dividend is 11 per cent., making 18½ per cent. for the year (same).

Oliver Pell Control, Ltd., announces that the question of payment of the preference dividend due on June 30th has been deferred. The dividend has been paid to June 30th, 1939.

The Calcutta Tramways Co., Ltd., is again paying a final dividend of 3 per cent., maintaining the distribution for the year at 5½ per cent.

Christy Bros. & Co., Ltd., are paying a dividend for the year of 11 per cent. (against 10 per cent.).

The East London Rubber Co., Ltd., has announced a dividend for the year of 7½ per cent. (against 5 per cent.).

New Companies

White & Poole (Engineers), Ltd.—Private company. Registered July 7th. Capital £2,000. Objects: To carry on the business of electrical, wireless and general engineers, etc. Directors: A. Poole and A. E. Poole, both of 33, Thornycroft Lane, Wolverhampton, and J. White, 58, Wychbury Road, Finchfield, Wolverhampton. Solicitors: Underhill, Willcock & Taylor, 7, Waterloo Road, Wolverhampton.

Heddesco, Ltd.—Private company. Registered July 5th. Capital £500. Objects: To carry on the business of manufacturers of and dealers in electrical, scientific and wireless instruments, electric lamps, torches and accessories, etc. Directors: D. M. Wilson, 59, Lyndhurst Road, Thornton Heath, Surrey, and E. A. Knight, 5, Cherry Gardens, Dagenham. Secretary: A. D. Cooper. Registered office: 63, Coleman Street, E.C.

Pyrometric, Ltd.—Private company. Registered July 3rd. Capital £1,000. Objects: To carry on the business of manufacturers and repairers of, and wholesale and retail dealers in, electrical apparatus of all kinds, and electrical or other apparatus and devices for measuring, testing and controlling temperature, etc. Directors: J. C. Lucas, 59, Islington Row, Birmingham, and A. M. Taylor, The Oaklands, Oaklands Avenue, Harborne, Birmingham 17.

Bardine Tool Co., Ltd.—Private company. Registered July 3rd. Capital £1,000. Objects: To carry on the business of mechanical and electrical engineers, manufacturers of machines, fittings and components, etc. Directors: J. H. Bufton, 51, Causeway Head Road, Dore, near Sheffield, and N. Malcolm, 939, Eccleshall Road, Sheffield. Solicitors: Broomhead, Wightman & Reed, Sheffield.

Companies' Returns

Statements of Capital

Telegraph Condenser Co., Ltd.—Capital £280,000 in 130,000 preference shares of £1 and 300,000 ordinary shares of 10s. Return dated May 22nd, 1941. All shares taken up. £32,503 10s. paid. £247,496 10s. considered as paid. Mortgages and charges: Nil.

E. Hammond & Co. (Auto-Electric), Ltd.—Capital £1,600 in £1 shares (400 preference and 1,200 ordinary). Return dated May 17th, 1941. 302 preference and 1,200 ordinary shares taken up. £702 paid. £800 considered as paid. Mortgages and charges: Nil.

R. Falshaw, Ltd.—Capital £5,000 in £1 shares. Return dated November 6th, 1940 (filed April 18th, 1941). All shares taken up. £2 paid. £4,998 considered as paid. Mortgages and charges: Nil.

Auto Exchange, Ltd.—Capital £1,800 in 800 preference and 1,000 ordinary shares of £1 each. All shares taken up. £803 paid on 800 preference and 3 ordinary. £997 considered as paid. Mortgages and charges: Nil.

Shardlow Electric Wires, Ltd.—Capital £1,000 in £1 shares. Return dated December 31st, 1940 (filed February 24th, 1941). 600 shares taken up. £600 paid. Mortgages and charges: Nil.

Oliver Electrical Supplies Co., Ltd.—Capital £100 in £1 shares. Return dated March 6th, 1941. All shares taken up. £100 paid. Mortgages and charges: Nil.

Telephone & Associated Services, Ltd.—Capital £15,000 in £1 shares. Return dated April 17th, 1941. All shares taken up. £3,000 paid; £12,000 considered as paid. Mortgages and charges: Nil.

Payne & Hornsby, Ltd.—Capital £5,000 in £1 shares. Return dated May 21st, 1941. All shares taken up. £5,000 considered as paid. Mortgages and charges: Nil.

Wellington District Electricity Co., Ltd.—Capital £70,000 in £1 shares. Return dated June 12th, 1941. 65,000 shares taken up. £65,000 paid. Mortgages and charges: Nil.

West Insulating Co., Ltd.—Capital £1,500 in £100 shares. Return dated May 21st, 1941. 10 shares taken up. £1,000 paid. Mortgages and charges: Nil.

Lustrolux, Ltd.—Capital £25,000 in £1 shares. Return dated February 28th, 1941. 9,002 shares taken up. £9,002 paid. Mortgages and charges: Nil.

Increases of Capital

Durham Cables, Ltd.—The nominal capital has been increased by the addition of £30,000, in £1 ordinary shares, beyond the registered capital of £30,000.

Insulating Sleevings and Tapes, Ltd.—The nominal capital has been increased by the addition of £500 beyond the registered capital of £1,000. The additional capital is divided into 10,000 deferred ordinary shares of 1s. each.

Lindow Engineering Co., Ltd.—The nominal capital has been increased by the addition of £1,500 in £1 ordinary shares, beyond the registered capital of £500.

Carbon Distributors of Great Britain, Ltd.—The nominal capital has been increased by the addition of £400, beyond the registered capital of £1,100. The additional capital is divided into 400 preference shares of £1 each, ranking *pari passu* with existing preference shares.

Cinema - Television, Ltd. — The nominal capital has been increased by the addition of £118,250 beyond the registered capital of £250,000. The additional capital is divided into 118,250 10 per cent. non-redeemable participating non-cumulative preference shares of £1 each.

Mortgages and Charges

Panel Fittings Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, dated June 19th, 1941, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

Underwood (Electric), Ltd.—Assignment of moneys due under certain contracts, dated June 25th, 1941, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £400.

Phœnix Telephone and Electric Works, Ltd.—Charge on freehold land and buildings at The Hyde, Edgware Road, Wembley, dated June 17th, 1941, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Vortexion, Ltd.—Assignment of all moneys due under a contract, dated June 25th, 1941, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

British Rola, Ltd.—Charge on all moneys payable under certain contracts, dated May 30th, 1941, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £50,000 at any one time.

Wingard M. A., Ltd.—Satisfaction to the extent of £500 on March 31st, 1941, of debentures created June 30th, 1936, and registered July 2nd, 1936. (According to the register of mortgages the debentures registered July 2nd, 1936, originally secured £1,500.) (Notice filed June 28th, 1941.)

(*Continued on page* 844)

STOCKS AND SHARES

TUESDAY EVENING

STOCK Exchange markets have been under the influence of something approaching a boomlet in gilt-edged securities, prices of British Government stocks going ahead in a manner which implies the employment of literally millions of pounds in the various issues. As a direct consequence, the stocks and shares of front-rank industrial concerns have been favourably affected by the diversion of capital into these securities. This week's lists of stocks and shares contain only one fall, while there are a number of rises.

Stock Exchange business is showing indication of expansion, and although this is the slack time of year as a rule, the current month makes an exception to the general expectation of business falling away to negligible proportions. The principal activity is in purely gilt-edged stocks; there would be more doing in other stocks and shares were there sufficient supply to meet the demand.

Industrial Ordinary Shares

The unceasing desire of investment to acquire ordinary shares in front-rank industrial companies is obvious from the steady rise in share prices. The capital seeking investment is that which overflows from the Consol market, where the yields are now slender; they offer no attraction to the man or woman who looks to dividends as the main source of income. The result of the present-day boom in gilt-edged securities is seen in the way in which the ordinary shares of industrial front-rank concerns are raised to levels at which the yield is comparatively small, though larger than the return which is afforded by purely gilt-edged stocks.

The Best Class Equities

Stock Exchange dealers in the industrial market confess that it is no use their trying to combat the view that the prices of the best class industrial shares stand unduly high. Not that it matters, nowadays, what a man thinks about relative values, considering that any opinion is liable to be upset as the result of the continual demand for first-class equities. Shares such as British Insulated, Callender's, General Electric and Henley's look fully valued at their current prices. Moreover, it has to be remembered that the would-be purchaser of to-day is not likely to find himself able to deal at the prices upon which the yields, set out in the table, are calculated, because these prices are middle quotations and nowadays it is easier to sell than to buy at the middle prices. Ask any jobber in the Stock Exchange market for the reason why shares such as these should command what are unquestionably high values, and the only answer, nine times out of ten, will be a shrug of the shoulders, with an admission that the market is already short of shares and that, under pressure of the continued demand, prices inevitably go up.

Electricity Supply Shares

As an example, Yorkshire Electric Power ordinary may be mentioned, a few thousand shares having come to market at 38s. 3d. and paying, on the basis of the last distribution of 8 per cent. dividend, no more than £4 3s. 9d. per cent. on the money. When expenses, brokerage, stamp and fee, etc., are allowed for, the yield comes to a trifle over 4 per cent., from which 10s. in the £ has to be deducted for income tax. A line of 5,000 Lancashire Electric Light & Power ordinary shares can be obtained at 32s. to pay £4 13s. 9d. and 5,000 Edmundsons ordinary at 26s. 3d., to give £4 11s. 3d. per cent. It may be possible, also, to obtain 5,000 British Light & Power Corporation ordinary shares at 25s., where the yield will be £4 16s. 0d. per cent., assuming that the dividend is repeated at 6 per cent. For the three years 1937-39 inclusive the British Power & Light Corporation paid an annual 7 per cent.; there was a reduction of 1 per cent. in the distribution for last year. Amongst shares in the Parliamentary companies, Clyde Valley Electrical Power ordinary came to market at 36s., giving £4 8s. 9d. per cent. on the dividend of 8 per cent., a rate that has been paid for years past.

Electrical Finance

Electrical Finance and Securities shares have been in scanty supply for some time past, and are now more scarce than ever, owing to the issue of a report which shows surprisingly little difference in the net profits. As already announced, the ordinary shares receive 12½ per cent. for the year. The carry-forward of £46,929 is virtually the same as that brought into the accounts. The meeting takes place on the Wednesday in this week. The company holds Provisional Orders for Pinner, Rickmansworth, and other places in the same vicinity. It has paid a dividend of 12½ per cent. since 1929 and occupies a strong financial position. There is £299,000 in 5½ per cent. debenture stock. If any of this stock should be outstanding on December 31st, 1963, it will be repaid at 100. The companies controlled by the Electric Finance and Securities Co., Ltd., may not raise funds except through the parent company, whilst any of the 5½ per cent. debenture stock remains in issue.

Miscellaneous Matters

Active business in Electric & Musical Industries served to run up the price 1s. to 12s. 3d. Part, at any rate, of the buying rested upon rumours that the company is doing very well with the bicycle side of its business. Each successive restriction upon the use of petrol has the effect of increasing the demand for the pedal "bike." Hopefulness talks with confidence of a possible 10 per cent. dividend in the autumn. The shares, it should be noted, are of the nominal value of 10s.—not £1, as some seem to think. General Electrics are ⅛ up at 83s. 9d. Ever Ready shares are a shade better at 28s. A. C. Cossor attract a good deal of interest at the moment and are up to 7s. 6d. Pye 5s. deferred shares retain their substantial rise to 13s. 9d. Among others, Crompton Parkinsons strengthened to 19s. 6d., Mather & Platt to 40s. and Walsall Conduits to 30s.

The Home Electricity market supplies improvements in Clyde Valley, City of London, London Associated, Northmet and West Gloucester ordinary shares. Amongst Overseas issues, Victoria Falls are higher at 76s. 3d., Palestine "A" at 16s. 3d. and Perak Hydro-Electrics at 17s. 6d. Home Railway stocks keep their strength: Southern 5 per cent. preference has hardened to 98. A rise of 20 in British Electric Traction deferred took the price to 835, which is 300 points above the stock's quotation a year ago.

Communications and Equipment

In the scramble for Stock Exchange securities it is natural that telegraph and other communication stocks should not be overlooked. Cable and Wireless ordinary dipped to 58½, but rallied sharply to 62. The 5½ per cent. preference is 2 up at 102. Buyers turned to Anglo-American Telegraphs, and, there being little stock on offer, the preferred rose to 105½, the deferred to 24½. These are, in both cases, the highest prices of the current year. Anglo-Portuguese Telephones are better at 15s. Oriental Telephones continued their rise, reaching 57s. 6d. Of the cable manufacturing shares, Enfields gained 2s. 6d. with a rise to 47s. 6d.; they had rather lagged behind the others in their group, and the yield of 5 guineas per cent. still compares favourably with similar investments. British Insulated are ⅛ up at 86s. 3d.; Callender's hold their last week's advance to 65s., and Henley's remain at 21s. 3d. It may be of service to point out that Johnson & Phillips, on the 15 per cent. dividend basis, return £6 3s. 0d. per cent. at their present price of 48s. 9d. Siemens at 21s. 3d. give a little over 7 per cent., and the company's 10 per cent. preference shares yield, at the current price of 38s., about £5 2s. 0d. per cent., a relatively high rate as compared with other preference shares in this class. Crabtree ordinary advanced to 26s. 3d., at which the yield is £6 13s. 4d.

Dividend Difficulties

Attention has been called to the dividend record of Brazilian Traction shares, and one or two others the quotations for which appear in our weekly list of prices. It will be noticed that the dividend columns are headed "Dividend: Previous and Last." The Brazilian Traction Company paid 50 cents in 1939 and twice as much in the previous year, but nothing has been paid since the former date and it is a little difficult to know how to deal with these dividend declarations without, at the same time, giving an impression which might mislead. Brazilian Tractions pay nothing at all at the present time.

To supply these dividends in the appropriate columns might conceivably give rise to the impression that the companies had paid the dividends in the last completed year. To put the matter in an extreme way, a company might have paid a dividend of 10 per cent. ten years ago, and nothing since. To print 10 per cent. as being the last dividend, as it was, would possibly create a wrong conclusion, and yet, without the addition of various footnotes, the correct state of affairs could not be shown. The matter is one which presents something of a problem, the solution of which is not too easy to discover.

Stock or Cash?

Study of balance-sheets at the present time may sometimes lead to useful conclusions. Most people, we all know, candidly confess their inability to read a balance-sheet. The cognoscenti, with equal frankness, admit that a balance-sheet can be framed in such a matter that the information it conveys is worth just nothing. Where, however, observation can obtain an occasional practical hint is in the items "stock in hand" and "cash." In some of the balance-sheets now appearing, it will be observed that the first item is becoming gradually distended, rather to the detriment of the cash position. The ultra-conservative mind probably asks whether the building up of cash reserves is not as important as it is to have plenty of stock in hand, the latter occasionally involving a bank overdraft. The matter may be considered of too abstract a nature for it to interest the ordinary investor in the street. Nevertheless, he can draw serviceable information from a closer scrutiny than he is in the habit of giving to balance-sheets in general. It is obvious that companies whose accounts can satisfy desiderata under both headings—stock in hand and cash in hand—occupy an enviable on position from the investor's point of view.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price July 14	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	48/6	45/–	15	12½	47/6	..	5 5 3
British Power and Light	27/9	23/–	7	6	24/6	..	4 18 0
City of London	22/6	20/–	7½	7	22/6	..	6 4 3
Clyde Valley	36/6	33/6	8	8	35/9	+⅛	4 9 6
County of London	34/6	30/–	10½	8	32/6	+⅛	4 18 6
Edmundson's :							
7% Pref.	31/–	25/6	7	7	30/9	..	4 11 1
Ord.	26/–	23/6	6	6	26/–	..	4 12 4
Elec. Dis. Yorkshire	39/–	36/–	9	9	38/9	..	4 12 9
Elec. Fin. and Securities	42/6	39/–	12½	12½	42/6	..	5 17 8
Elec. Supply Corporation	39/6	36/–	11½	10	39/6	..	5 1 3
Isle of Thanet	8/–	6/–	2	Nil	8/–	..	—
Lancs Light and Power	32/–	28/6	7½	7½	32/–	..	4 13 9
Llanelly Elec.	21/–	19/6	5½	5½	20/–	..	5 10 0
Lond. Assoc. Electric	17/6	12/6	5½	4½	17/–	+⅛	5 6 0
London Electric	23/6	21/3	7	7	22/6	..	6 4 5
London Power Deb. Red.	105½	102	5	5	103½	..	4 16 7
Metropolitan	34/6	31/–	10	8	32/6	..	4 18 6
Midland Counties	36/6	32/9	8	8	36/3	..	4 8 5
Mid. Elec. Power	35/–	33/3	9	9	35/–	..	5 2 10
Newcastle Elec.	26/3	24/6	7	7	25/–	..	5 12 0
North Eastern Elec. :							
Ordinary	29/–	25/6	7	7	28/3	..	4 19 1
7% Pref.	32/6	29/–	7	7	32/6	..	4 6 2
Northampton	2⅛	39/6	10	10	41/3	..	4 17 0
Notting Hill 6% Pref. (£10)	9	8	6	6	8½	..	—
Northmet Power :							
Ordinary	34/6	28/6	10	7	31/3	+½	4 9 7
6% Pref.	29/6	27/3	6	6	29/6	..	4 1 4
Richmond Elec.	20/–	18/–	6	6	20/–	..	6 0 0
Scottish Power	36/6	33/–	8	8	36/3	..	4 8 5
Southern Areas	16/6	14/6	5	5	16/3	..	6 3 0
South London	20/–	19/3	7	7	20/–	..	7 0 0
West Devon	21/6	20/9	5	5	21/3	..	4 14 1
West Glos.	18/3	17/3	4½	4½	18/3	+9d.	4 18 8
Yorkshire Elec.	38/3	34/6	8	8	38/3	..	4 4 0
Overseas Electricity Companies							
Atlas Elec.	2/6	1/6	Nil	Nil	2/6	..	—
Calcutta Elec.	37/3	33/–	8*	7*	35/6	..	3 19 0
Cawnpore Elec.	30/–	26/–	10	10	28/9	..	7 5 9
East African Power	25/6	21/6	7	7	25/–	..	5 12 0
Jerusalem Elec.	22/6	18/6	7	7	18/9	..	7 9 4
Kalgoorlie (10/–)	12/6	11/–	7½	7½	12/6	..	6 0 0
Madras Elec.	25/3	23/6	8*	6*	23/3	+3d.	—
Montreal Power	31	24	1½	1½	24½	..	6 2 5
Palestine Elec. "A"	20/6	14/–	Nil	Nil	16/3	+1/9	—
Perak Hydro-electric	18/3	16/3	2½	6	17/6	+⅛	6 17 2
Shawinigan Power	18½	14	83cts.	90cts.	15½	−1	—
Tokyo Elec. 6%	40½	33	6	6	35½	..	16 18 0
Victoria Falls Power	76/6	69/6	15	15	76/3	..	3 18 9
Whitehall Investment Pref.	14/9	8/3	7½	7½	12/–	..	12 10 0
Public Boards							
Central Electricity :							
1950–70	110½	108	5	5	110½	..	4 10 6
1955–75	113½	109½	5	5	113	..	4 8 6
1951–73	108	105½	4½	4½	107	..	4 4 1
1963–93	101	94	3½	3½	100	..	3 10 0
1974–94	94	87½	3½	3½	94	..	3 9 2
London Elec. Trans. Ltd.	94	91½	2½	2½	94	+1	2 13 2
London & Home Counties							
1955–75	108	106	4½	4½	106½	+½	4 4 6
Lond. Passenger Transport :							
A	120	109	4½	4½	114½	..	3 18 4
B	114	102½	5	5	109½	..	4 11 4
C	38	29	1½	3	37	..	8 2 2
West Midlands Joint Elec.							
1948–68	108½	103	5	5	108½	..	4 12 0
Telegraph and Telephone							
Anglo-Am. Tel :							
Pref.	106	99	6	6	105½	+1	5 13 9
Def.	25	21	1½	1½	24½	+1	6 2 5
Anglo-Portuguese	17/6	12/6	8	8	15/–	+½	10 13 4
Cable & Wireless :							
5½% Pref.	102	93	4½	5½	102	+2	5 7 10
Ord.	68	52½	4	4	62	+3	6 9 0
Canadian Marconi $1	5/–	4/–	Nil	4cts.	5/6	..	3 4 0
Globe Tel. & Tel. :							
Ord.	29/–	26/–	7½*	6*	27/6	..	4 7 3
Pref.	28/–	25/–	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	14	10½	20	20	12½	..	—
Inter. Tel. & Tel.	3¼	2½	Nil	Nil	3	..	—
Marconi-Marine	25/–	19/9	7½	7½	25/–	..	6 3 0
Oriental Telephone Ord.	57/6	47/–	11½*	16	2⅝	+⅛	5 11 4
Telephone Props.	11/6	11/–	6	6	11/3	..	10 13 4
Telephone Rental (5/–)	7/9	6/9	10	10	7/3	..	6 18 0

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price July 14	Rise or Fall	Yield p.c. £ s. d.
Traction and Transport							
Anglo. Arg. Trams :							
First Pref. (£5)	2/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	8½	4	Nil	Nil	6	..	—
British Electric Traction :							
Def. Ord.	840	740	45	45	835	+20	5 7 9
Pref. Ord.	180	150	8	8	160	−20	5 0 0
Bristol Trams	40/–	36/–	8*	8	36/3	..	4 8 5
Brazil Traction	9½	6¼	$1	50c.	8¾	+1	—
Calcutta Trams	19/9	18/–	8	5½	18/–	..	6 2 3
Cape Elec. Trams	17/6	16/6	5	5	17/–	..	5 17 4
Lancs Transport	40/–	36/–	10	10	40/–	..	5 0 0
Mexican Light :							
1st Bonds	40	34½	5	5	40	..	—
Rio 5% Bonds	85½	82½	5	5	85	..	5 17 8
Southern Rly. :							
5% Prefd.	55	43½	5	5	54½	..	9 3 6
5% Pref.	98	77½	5	5	97½	+1	5 2 7
T. Tilling	44/–	34/6	10	10	43/9	..	4 11 4
Tilling & B.A.	52/–	45/6	8*	7*	50/–	..	2 16 0
West Riding	38/–	34/–	10	10	38/–	..	5 5 4
Equipment and Manufacturing							
Aron Electricity Ord.	18/6	16/–	15	Nil	18/–	..	—
Assoc. Elec. :							
Ord.	42/6	38/3	10	10	42/6	..	4 14 3
Pref.	36/–	33/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	45/–	..	5 11 1
Babcock & Wilcox	44/–	39/–	11	11	43/9	..	5 0 6
British Aluminium	44/6	39/–	12½	10	44/6	+9d.	4 10 0
British Insulated Ord.	88/3	78/9	20	20	86/3	+⅛	4 12 10
British Thermostat (5/–)	12/6	10/6	18½	18½	12/6	..	7 8 0
British Vacuum Cleaner (5/–)	6/3	6/–	40	12½	6/3	..	10 0 0
Brush Ord.	4/3	3/6	Nil	Nil	3/9	..	—
Callender's	65/6	58/6	15	15	65/–	..	4 12 4
Chloride Elec. Storage	63/6	60/–	15	15	62/6	..	4 15 10
Consolidated Signal	65/–	60/–	17	17	62/6	..	5 8 7
Crabtree (10/–)	25/–	21/3	17½	17½	26/3	+⅛	6 13 4
Crompton Parkinson :							
Ord. (5/–)	19/6	17/9	30	20	19/6	+9d.	5 2 8
E. K. Cole (5/–)	7/6	2/9	10	Nil	7/–	..	—
Elec. & Musical Industries (10/–)	12/6	7/3	5	Nil	12/3	+1/–	—
Electric Construction	35/–	25/–	10½	10	32/6xd.	+1/–	6 3 0
Enfield Cable Ord.	51/–	45/–	16½	12½	47/6	+½	5 5 3
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	35/–	29/–	10	10	35/–	..	5 14 2
Ensign Lamps (5/–)	16/3	15/–	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)	37/3	35/–	25*	22*	35/–	..	3 2 10
Ever Ready (5/–)	28/–	25/–	40	40	28/–	+3d.	7 2 10
Falk Stadelmann	16/9	13/9	6	7	15/9	..	8 17 10
Ferranti Pref.	26/6	23/6	7	7	26/3	..	5 6 10
G.E.C.							
Pref.	33/–	30/6	6½	6½	32/6	..	4 0 0
Ord.	84/–	77/–	20	20	83/9	+⅛	4 15 8
Greenwood & Batley	21/–	18/6	15	13	20/–	..	13 0 0
Hall Telephone (10/–)	14/–	10/–	15	10	13/9	..	7 5 6
Henley's (5/–)	21/6	19/6	20	20	21/3	..	4 14 1
4½% Pref.	21/6	20/–	4½	4½	21/3	..	4 4 8
Hopkinsons	46/6	37/6	15	15	46/3	..	6 9 10
India-Rubber Pref.	21/6	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	100/–	81/3	32½	30	100/–	..	6 0 0
J. Lucas	59/–	50/6	15	15	58/9	..	5 2 0
Johnson & Phillips	48/9	43/–	15	15	48/9	..	6 3 0
Lancashire Dynamo	53/6	50/–	20	20	52/6	..	7 12 5
Laurence, Scott (5/–)	10/6	7/6	15	15	10/6	..	7 2 10
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	40/–	32/–	13½	10	40/–	+6d.	5 0 0
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	84/6	75/–	20	20	83/9	..	4 15 8
Pye Deferred (5/–)	14/–	10/9	25	25	13/9	..	9 1 10
Revo (10/–)	25/–	18/9	5	20	25/–xd.	+9d.	8 0 0
Reyrolle	55/–	47/9	12½	12½	55/–	..	4 10 3
Siemens Ord.	22/9	17/–	7½	7½	21/3	..	7 1 2
Strand Elec. (5/–)	2/–	1/–	4	2	2/–	..	5 0 0
S. Smith (1/–)	7/9	5/9	37½	50	6/3	..	8 0 0
Switchgear & Cowans (5/–)	9/–	7/3	10	15	8/9	..	8 11 6
Telegraph Condenser (10/–)	12/6	7/–	Nil	5	10/–	—⅛	5 0 0
Telegraph Construction	40/–	34/6	10	10	40/–	..	5 0 0
Telephone Mfg. (5/–)	7/6	6/9	9	9	7/3	..	6 4 2
Tube Investments	95/–	89/–	23¾	23¾	93/9	..	5 1 3
Vactric (5/–)	2/3	2/–	4	Nil	2/–	..	—
Vickers (10/–)	16/–	14/–	10	10	15/9	..	6 7 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	16/6	..	5 19 9
Westinghouse Brake	42/6	39/6	17½	10	42/–	..	4 15 1
Walsall Conduits (4/–)	29/–	24/6	55	55	30/–	+⅛	7 6 9
West Allen (5/–)	4/3	3/6	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

Financial Section (*Concluded from page* 841)

Spensers (London), Ltd.—Satisfaction in full on June 24th, 1941, of debentures registered April 20th, 1935, securing £3,000.

Reduction of Capital

Central London Electricity, Ltd.—A petition for the confirmation of the reduction of the company's capital from £6,914,760 to £6,271,609 was presented to the High Court on June 26th, and will be heard at the Law Courts, London, on July 21st.

Liquidations

Radio Central Exchanges, Ltd.—Particulars of claims by July 29th to the liquidator, Mr. F. J. Bellchambers, Bush House, Aldwych, London, W.C.2. This notice is formal. All debts of the company have been or will be paid in full.

Bankruptcies

W. Cornell, lately trading as W. T. Cornell, 33, Holland Street, Kensington, London, W., electrical engineer, etc.—The public examination of this debtor was held on July 9th at the London Bankruptcy Court before Mr. Registrar Kean. Replying to the Official Receiver debtor stated that his liabilities amounted to £301, whilst his assets, after allowing £53 for preferential claims, were £146. He added that in 1918 he took over his father's business and was fairly successful until the outbreak of war, when the trade declined owing to the evacuation of customers from the district. The examination was adjourned for a fortnight.

G. W. Linsell, radio and electrical dealer, Tippendale Lane, Park Street, near St. Albans, lately trading at 26, London Road, St. Albans.—Application for discharge to be heard on August 5th at the Court House, St. Albans, Herts.

L. Dixon, electrician, 209, Hall Street, Stockport, formerly trading at 165, Great Portwood Street, Stockport.—Receiving order made July 3rd on debtor's own petition.

J. O. D. James (James & Whiting), electrician, 102, Chepstow Road, Newport (Mon.)—Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver, released July 2nd.

H. M. Brown (Wood & Co.), electrical engineer, 97, St. Helen's Street, Ipswich.—Discharge suspended for two months until August 11th, 1941.

S. D. C. Orchard (Empire Radio), electrical engineer, 43, Malmesbury Road, Shirley, Southampton.—Application for discharge refused.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aberdeen.—July 28th. Corporation. Three months' supply of various articles, including electrical fittings. Schedule from City Engineer's Office, Town House.

Australia.—SYDNEY (N.S.W.).—November 13th. County Council. 33-kV switchgear and associated equipment for the Pyrmont power station.

Eire.—LURGAN.—July 21st. Urban District Council. One single-stage electric pump (total head 40 ft.); one multi-stage electric pump (static head 200 ft.); one Diesel engine; one alternating set; and four mechanical filters, portable chlorinator, etc. Plan and particulars from J. D. Gordon, engineer, Town Hall, Lurgan.

Kettering.—August 6th. Electricity Department. Oil-immersed transformers. (July 11th).

New Zealand.—POSTS AND TELEGRAPH DEPARTMENT.—August 13th. Switchboard cords. August 25th. Condensers and three-conductor cords. August 29th. Cadmium-copper binders and tapes. September 1st. Tumbler switches and fuses. September 2nd. 60 tons of copper wire. September 5th. 60 miles of tinned copper wire.

AUCKLAND HARBOUR BOARD.—September 30th. Ten 5-ton electric cranes.

Plymouth.—August 13th. Electricity Supply Department. Valve for circulating water system, and rotary boiler feed pump. (See this issue.)

Radcliffe. — Electricity Department. Switchgear, transformers and cables. (See this issue.)

Orders Placed

Blackburn.—Electricity Committee. Accepted. Coal-handling plant (£50,949).—Simon-Carves. Sidings and signalling equipment (£12,900).—L.M.S. Railway. "Mulsifyre" patent fire protection equipment (£4,487).—Mather & Platt. 33-kV cable (£1,252).—Henley's.

Chesterfield.—Electricity Committee. Recommended. Transformer (£3,396)—B.T.H. Feeder and pilot cables (£526).—Aberdare Cables.

Dewsbury.—Town Council. Accepted. Electrical equipment, master controller, 193 buzzer alarms and 193 adaptors, and four receiving siren units for air-raid warning (£3,072).—Standard Telephones and Cables, Ltd.

Eccles.—Electricity Committee. Accepted: e.h.v. switchgear (£993) and l.v. 8-panel switchboard (£227).—Metropolitan-Vickers. L.v. distribution board (£35).—English Electric Co.

Formby.—U.D.C. Accepted. Electric vehicle (£388, less 7½ per cent).—Metropolitan-Vickers.

Newcastle-on-Tyne.—City Council. Accepted. Electrical installation at Rutherford Technical College (£171).—Falconar, Cross and Co.

X-ray unit and equipment for the Newcastle General Hospital (£2,285).—Victor X-ray Corporation.

Richmond (Yorks).—Town Council. Accepted. 150-kVA transformers (£324).—Ferranti.

South Kesteven.—Rural District Council. Accepted. Installation of electricity at the Isolation Hospital (£325).—Mr. Palmer.

South Shields.—Town Council. Accepted. Installation of a meter system in the Transport Dept. (£400).—Metropolitan-Vickers Electrical Co.

Two steel bus bodies (£970 each).—Metropolitan Cammell-Weymann. Two trolley bus bodies (£1,157 each).—C. H. Roe.

X-ray apparatus (£1,506).—Newton and Wright.

Stretford.—Town Council. Accepted. Alterations to telephone switchboard for additional lines.—Ericsson Telephones, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work s definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick. — Community feeding centres; U.D.C. surveyor.

Ashover.—Approved school and remand home for 65 junior boys for Derbyshire C.C. (£3,500); J. Harrison, county architect, County Offices, St. Mary's Gate, Derby.

Blackburn.—Remand home for girls, for T.C.; W. Pickstone, borough surveyor, Town Hall.

Boothstown.—Alterations to "Holmlea" for remand home for 65 junior boys for Lancashire E.C. (£750); S. Wilkinson, county architect, County Offices, Preston.

Consett (co. Durham).—British Restaurants; P. A. Leath, surveyor, U.D.C. offices, Blackhill.

Cheltenham.—Social club, 444 High Street; Stratton Davis & Yates, architects, Gloucester.

Corn store, Town Flour Mills, Winchcomb; Titchmarsh & Hunt, Ltd.

Cheshire.—Hostels for men, for C.C.; F. A. Browne, county architect, The Castle, Chester.

Eccles.—Alterations, St. Andrews C.E. School; C.E. Diocesan architect.

Felling-on-Tyne.—Central kitchen, Wallis Street, for the U.D.C. (£1,100); H. Fawcett, surveyor.

Fifeshire.—Feeding centres for 123,000 for County Council; county clerk, Cupar.

Hastings.—Three flats, 14 Cloudesley Road, for Mr. W. H. Cremer; H. M. Jeffrey, architect.

Hebburn-on-Tyne.—Community kitchen at the Methodist Church for the U.D.C. (£499); J. M. Black, Ltd., builders, Glen Street.

Hereford.—Bakehouse, Belmont Road, for Blanche & Son; Robinson & Son.

Houghton-le-Spring.—British Restaurants at Fence Houses and Shiney Row; V. J. Hunter, U.D.C. architect.

Leeds.—College of Art, Commerce and Technology, Vernon Street, Gt. George Street, Cookridge Street for E.C. (£350,000); P. B. Haswell, city education architect, 1, Calverley Street.

Littlehampton.—Store, Rope Walk; W. Osborne & Sons, Ltd.

London.—BERMONDSEY.—Alterations, 36-8, Rothsay Street; Leighton & Higgs.

Store, Galleywall Road, for W. S. Shuttleworth & Co., Ltd.; Minoprio & Spenceley.

Mansfield.—Extensions, bakery; W. Brown, baker, Mount Street.

Newcastle (Staffs.).—Hostel for 30 agricultural workers, Roe Farm estate; Ministry of Works and Buildings, Westminster, S.W.1.

Newport (I.O.W.).—Store, Medina Ave.; Westmore, Ltd.

Pendlebury.—Houses (80), Gate Street, Knowles Square and Beech Farm Estates, for T.C.; A. Cordwell, borough surveyor, Town Hall, Swinton, Manchester.

Rochdale.—Canteen and rest room at cotton mill; Standard Mill, Ltd., Corporation Street.

South Shields.—Canteen for John Readhead and Sons, Ltd.; own architects.

Community kitchens, Little Horsley Hill Estate; A. G. Richardson, acting borough engineer.

Spennymoor (co. Durham).—Feeding centres at King Street and Mount Pleasant Schools; C. Spencer, surveyor, Urban Council offices.

Stretford.—Crushing plant building, Trafford Wharf Road; British Oil & Cake Mills, Ltd.

Assembly building, canteen and boiler house, &c., Barton Dock Road; Ford Motor Co., Ltd.

Sunderland (co. Durham).—Canteen and kitchen; Short Bros.

Reconstruction of warehouse, Fulwell Road, for Sunderland Equitable Industrial Society; C.W.S. Building Department, contractors, West Blandford Street, Newcastle-on-Tyne.

Wakefield.—Store, 113 Westgate, for Mr. H. Hoffman, and flats (4), Blenheim Road, for Ambred, Ltd.; W. H. Ogden, architect.

Canteen and store, Alverthorpe Mills, Flanshaw Lane, for Matthew Walker & Sons, Ltd.; James Brodie.

Wallsend-on-Tyne.—New houses proposed by Town Council; J. A. Blench, borough engineer, Town Hall.

Wigan.—Orthopædic department, Royal Albert Infirmary, Wigan Lane, for Board of Management; A. Stanley Brunt, gen. supt. and secretary.